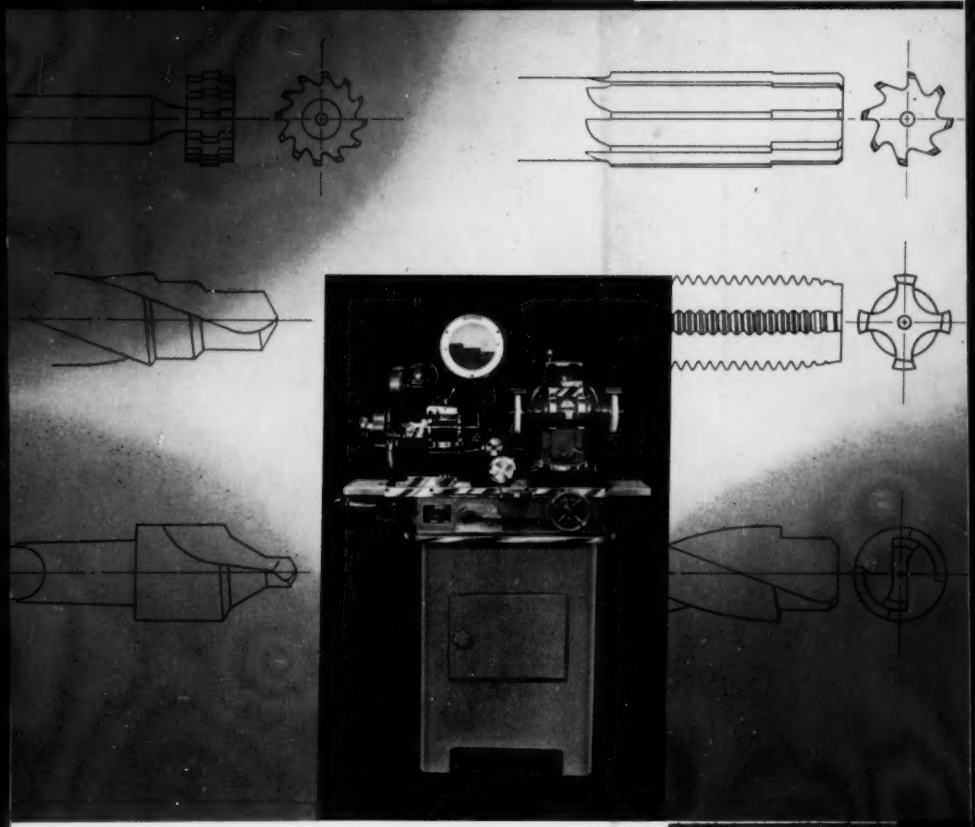
modern machine shop

SPINNING TITANIUM AUTOMATICALLY
See Page 108

MILLING APPLICATIONS UNLIMITED
See Page 136

OCTOBER 1958

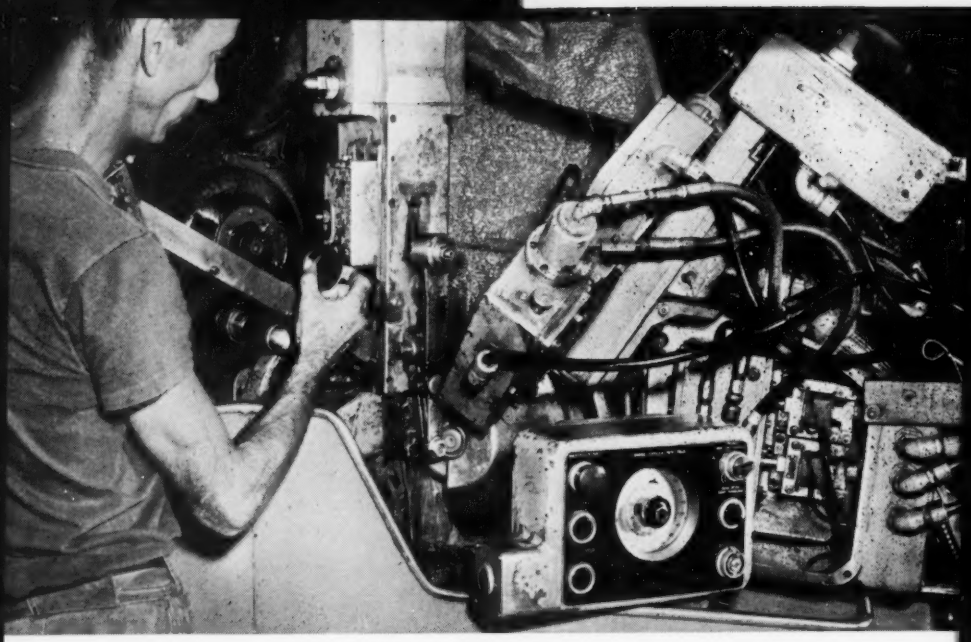


Are you sharpening your cutters or grinding away their life?
See page 281

For more data circle 301 on Postpaid Card

RO
UNIVERSAL FORM RELIEVING FIXTURE
R-O Grinder

L. FORNEY, *Publisher*
CHARD S. KLINE, *General Manager*



bearing life boosted from

THREE WEEKS TO FOUR YEARS

with Texaco Cleartex Oil

Tyson Bearing Corp., Division of SKF Industries, Massillon, Ohio, extended the life of micro-centric grinder bronze sleeve bearings from 3 weeks to 4 years using *one* oil—Texaco Cleartex B—for both grinding *and* machine lubrication.

Before Cleartex was used, machine bearings would fail in about 3 weeks, because the lubricant became contaminated by grinding oil. With Cleartex this problem simply doesn't exist. A premium quality lubricant, Cleartex is *also* a fine grinding oil. In fact, Tyson now gets as many as 20 pieces per wheel dressing, each with a better finish, compared to the 10 or 12 that were previously obtained.

You can do any machining work better, faster and at lower cost with Texaco.

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

For more data circle 302 on Postpaid Card

L. FORNEY, *Publisher*
CHARD S. KLINE, *General Manager*
RED W. VOGEL, *Editor*
OBERT I. SHORE, *Managing Editor*
OUIS H. DOERMAN, *Assistant Editor*
C. DUE, *Editorial Assistant*
LBERT C. CLOSE, *Field Editor*
FRED M. COOPER, *Contributing Editor*
ORMAN S. ROGERS, *Art Editor*
OWARD CAMPBELL, *Editor Emeritus*

contents

modern machine shop

Published in the Machine Tool Capital of the World

Vol. 31, No. 5, October, 1958

FEATURES IN THIS ISSUE

Spinning — AUTOMATIC SPINNING OF TITANIUM 108
By Gilbert C. Close

Riveting — RIVETING IS NO SMALL JOB 116
By Bartlett West

Automation — MAXIMUM AUTOMATION FEATURED IN ENGINE PLANT 122
By Fred W. Vogel

Milling — MILLING APPLICATIONS UNLIMITED 136
By Colin Sharp

Scrap Handling — SCRAP HANDLING 144

Materials — MACHINING STAINLESS STEEL 148
By G. J. Stevens

Carbide Tooling — CARBIDE COATING PROCESS INCREASES TOOL LIFE 150

Welding — WELDING TIME CUT IN HALF 151

Honing — SLIDE HONING MACHINE CUTS FINISHING COSTS 152

Machining — MULTI-UNIT AUTOMATIC FOR BRAKE CYLINDERS 156

Tool Maintenance — DIAMOND USED TO DRESS AIRFOIL GRINDING WHEEL 158

Die Design — FINGER STOP 160
By F. Murray

Tool Design — ANGULAR SLOTTED BUSHING FOR STEADY REST 160
By H. J. Gerber

Fixtures — AUXILIARY TUBING VISE 162
By Roger Isetts

Jigs — JIG FOR DRILLING VARIOUS DIAMETER PARTS 164
By F. C. Elmo

EPARTMENTS

PORTANT MEETING DATES 48
OVERTISING REPRESENTATIVES 70
EE LITERATURE 90
VER THE EDITOR'S DESK 102
ODUCTION THRU MODERNIZATION 150
IDEAS FROM READERS 160
NEWS OF THE INDUSTRY 166
NEW SHOP EQUIPMENT 176
WHERE TO GET IT 278
INDEX TO ADVERTISEMENTS 286

NBP Member BPA

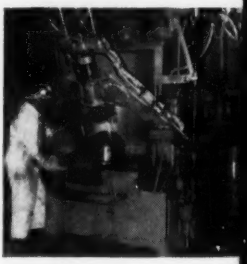
blished monthly and copyrighted (1958) by Gardner Publications, Inc., 431 Main St., Cincinnati 2, O.
nted in U.S.A.
Accepted as controlled circulation at Cincinnati, Ohio.

features in hi

Assembling & Finishing... Inspecting, Testing & Contro
Press Working... Management & Safe Practices... Mate
& Processes... Production Machining... Tooling & De

AUTOMATIC SPINNING OF TITANIUM

By Gilbert C. Close



This article provides a detailed discussion of the machines and processes used at Titanium Fabricators, Incorporated, Burbank, California, in producing hot spun titanium hemispheres for use in the missile and rocket fields, as well as in the fabrication of pressure vessels and bottles, in heat exchangers for shields, and for rounded ends on elongated containers of all types.

Page 108

RIVETING IS NO SMALL JOB

By Bartlett West

Semi-automatic riveter of unique design is used in the scatter-pattern riveting of large fuselage panels for huge, new DC-8 jet-propelled airliners.

Page 116

MAXIMUM AUTOMATION FEATURED IN ENGINE PLANT

By Fred W. Vogel

Few plants around the country, particularly in the field of automobile production, have more to offer in the way of an outstanding example of efficiently organized automated production operations than the Ford Motor Company's new engine plant located in Lima, Ohio. This picture story emphasizes the points in an interesting manner.

Page 122

MILLI
By Co
The a
cutters
applic
and di
alumi
two-pi
bambo
cutters
produc
very n
Page

SCRA
In its
tem, G
Compa
manufa
Illinois
plants
hopper
tion; h
devised
of its
particu
efficien
Page

MACH
By G.
Increas
ocation
stainles
Page

this issue

TOBER 1958 • VOL. 31 • NO. 5

modern machine shop

MILLING APPLICATIONS UNLIMITED

By Colin Sharp

The author describes some unusual uses for milling cutters which could possibly inspire additional applications. Unusual types of cutters illustrated and discussed include a cutter designed for milling aluminum foil for use as a flash bulb filament; a two-piece carbide tipped cutter used for milling of bamboo for fishing rods; and a set of special milling cutters, four feet in length, designed for the accurate production of diamond shaped soap flakes within very narrow size limits.

Page 136

SCRAP HANDLING



In its scrap handling system, Greenlee Brothers and Company, machine tool manufacturer of Rockford, Illinois, parallels many plants in that it utilizes hoppers for scrap collection; however, Greenlee has devised some innovations of its own that make its particular scrap handling system faster and more efficient than usual.

Page 144

MACHINING STAINLESS STEEL

By G. J. Stevens

Increasing carbide tool size and modifying tool location makes possible the successful boring of stainless steel tubing, according to this case history.

Page 148

LANROLL attachment exclusive features

The LANROLL Attachments offer certain features of design not generally found in Thread Rolling Tools of this type: (1) Disengaging the attachment from the shank for servicing and tooling changes without disturbing the original set-up (Figure 1), (2) Tipping avoids indexing interference on bar automatics having a limited tool slide movement (Figure 2), (3) A Gage quickly determines the precise position where the vertical centerlines of both the rolls and workpiece coincide (Figure 3).

The LANROLL Attachment (capable of producing straight or taper threads) is primarily for application to bar automatics, but may be applied very successfully to the cross slide of a lathe with power feed. Five sizes of the Attachment thread all diameters from #5 to 1-3/4" (1/16" to 1-1/4" pipe). For additional information, request Bulletin G-96. 516

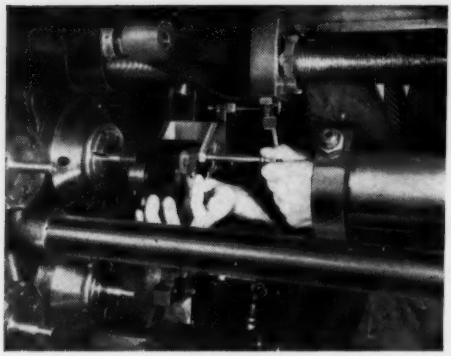


figure 1

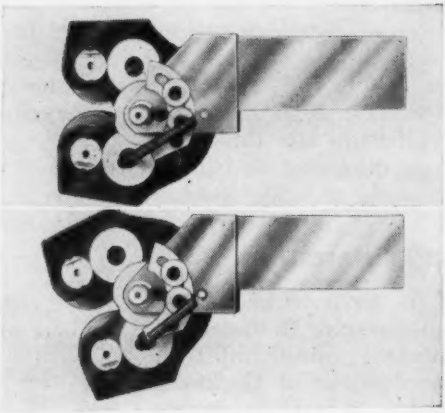


figure 2

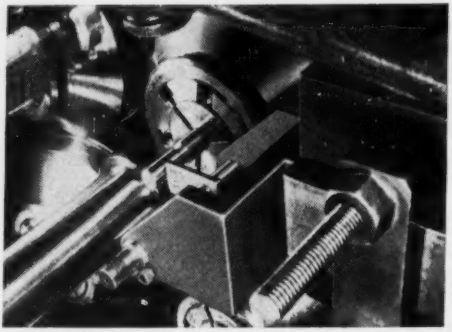


figure 3

LANDIS *Machine* COMPANY
WAYNESBORO
PENNSYLVANIA

For more data circle 305 on Postpaid Card

New accomplishment in automation with new Logamatic 410

automated turret lathe with air-hydraulic cross slides



Only the Logan Logamatic 410 offers so many features in its price range! Swing over bed, 14⅝". Swing over cross slide, 6⅞". Spindle bearings: (4) ABEC Class 7. Speed range, 25 to 2,000 rpm. Two-speed, 3—1½ hp. Dinabrake motor and controls are standard equipment.

$8,800.00*

*F.O.B. factory, including motor and controls complete, less 8" power chuck accessory. Price subject to change.

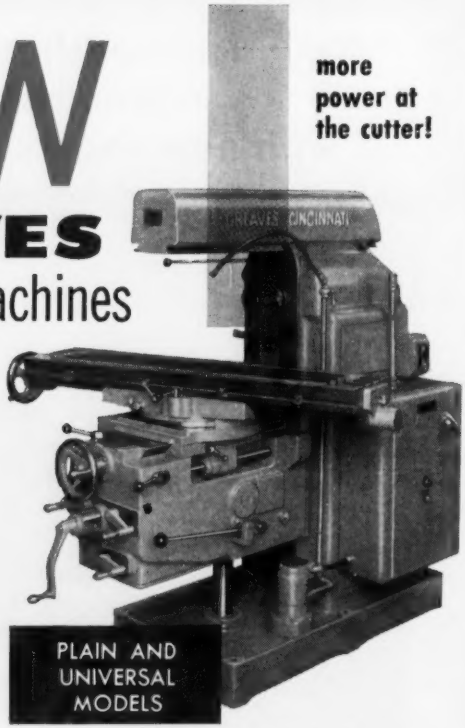
- Electric power-turret feed
- Automatic cycling
- Adjustable rapid travel
- Variable-rate turret feed
- Variable-rate cross slide feed
- Variable-speed drive
- Pushbutton control
- Available as bar-feed machine
- L-0 spindle nose

LOGAN ENGINEERING CO. Dept. L-1058 4901 Lawrence Avenue, Chicago 30, Illinois

For more data circle 306 on Postpaid Card

new GREAVES 2-XH Milling Machines

more power at the cutter!



PLAIN AND UNIVERSAL MODELS

The completely new GREAVES No. 2-XH Milling Machine brings added versatility, increased operational ease, and more power where it's needed most . . . *at the cutter!*

It utilizes two motors, one for spindle drive; a separate motor for moving table, saddle and knee. Compare this and the other outstanding features of the new Greaves Mill. You'll see why Greaves is "The MOST Mill for the LEAST Money."

Write for detailed literature!

- Wide range of speed/feed combinations for any type material, any type job.
- Heavy, internally ribbed column casting and heavy duty rectangular overarm for maximum rigidity.
- Large, heavy-duty knee, saddle and table provide accuracy for all types of milling.
- New 7½ HP spindle drive motor, with separate motor for movable components, provides extra power for heavy milling.
- Easy-to-reach controls. Handwheels and vertical crank disengage automatically when not in use.
- New rapid traverse lever within operating control area.
- Separate drive motor for table, saddle and knee provides more smooth balanced power at the cutter.

GREAVES
MACHINE TOOL DIVISION

J. A. FAY & EGAN COMPANY
2700 Eastern Avenue, Cincinnati 2, Ohio

For more data circle 307 on Postpaid Card

For more data on advertisement on opposite page circle 308 on Postpaid Card ——→

it's mainly a matter of TIMING!



Q. ***WHEN should you replace a machine?***

A. ***When you can do it at a PROFIT!***

Obsolescence is an insidious thing. It can overtake any machine —even a relatively new one—without warning. And when it does, you're producing at a *loss.*

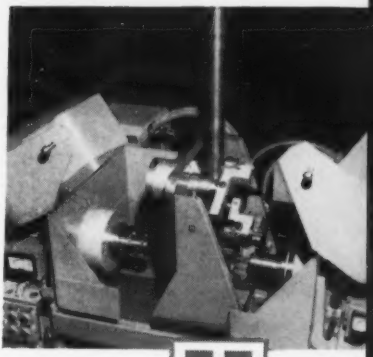
The only way to catch it in *time* is to make frequent studies, comparing the production cost of the old machine with that of the new one that might replace it. Then weigh these costs in terms of investment and return. Up to a certain point, the old machine will still be profitable to operate. Beyond that point, it's running *in the red.*

Heald sales engineers are well experienced in precise methods of replacement analysis. And they will be glad to help you determine when you can replace an existing machine *at a profit.* Similar cost studies by Heald engineers have pointed the way to many important cost savings.



For example: This new Heald Model 322 Bore-Matic replaced a heavy-duty drill for boring and chamfering hydraulic-cylinder piston rods. A cost analysis determined that the investment in a new machine could not be deferred any longer without serious financial loss. As verified by subsequent operation, the new machine offered the following savings:

	Old Machine	New Machine
Parts per hour	11	24
Machine load, per year	3,080 hrs.	1,380 hrs.
Direct & Indirect Labor	9,480 hrs.	3,240 hrs.
Annual Maintenance	$356	$100
Annual Operating Cost	$27,800	$15,000
Annual Saving, New Machine		$12,800
Net Return on Investment		39.6%



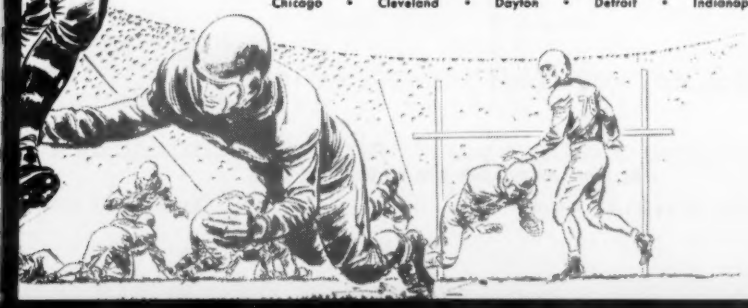
YOU pay for obsolescence. Replacement pays for itself!

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



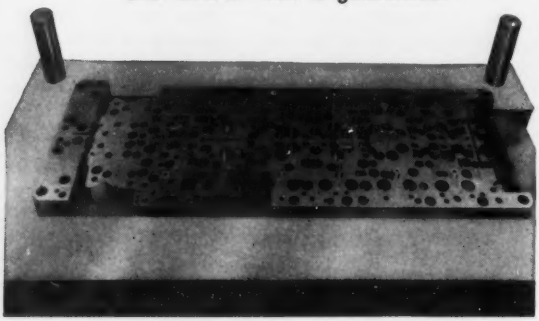
58 page →

H LES JIG GROUND with

Vulcanaire



Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



Borrow our instructive 11 minute movie on Jig Grinding.

A seven station die from Vulcan's contract Tool Room . . . Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

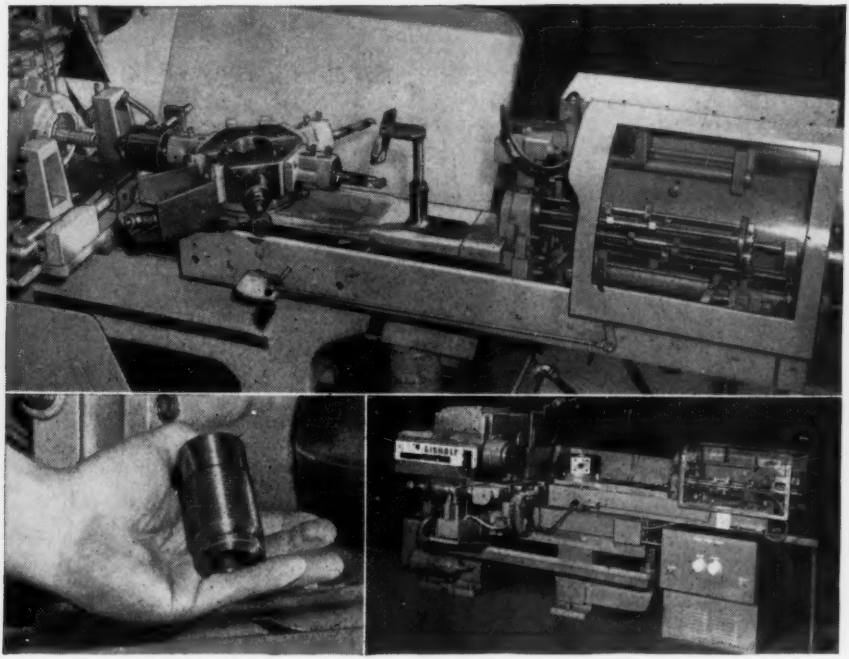
*Vulcanaire equipment pays for itself on the first job.

SERVICES OF YOUR TOOL ROOM IN DAYTON
ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO., YOUR TOOL ROOM IN DAYTON
710 LORAIN AVENUE • DAYTON 10, OHIO

VULCAN
tools

For more data circle 309 on Postpaid Card



250% Production Increase with this setup

Gets full automation on small job-lot production runs using hydraulic drive on Gisholt Ram Type Turret Lathe

Floor-to-floor time on the job shown here—a threaded collar 3¼" long with 1¹¹⁄₁₆" diam.—was cut from 8.1 minutes (with hand operation) to just 3.25 minutes. All operations and machine functions are automatically controlled with the Lynn Hydraulic Drive Unit on a Gisholt Ram Type Turret Lathe.

Here's how the finished workpiece is completely machined from bar stock in one fast, automatic operation: The stock is fed pneumatically against a turret stop, chucked, start-drilled, then finish-bored with a large drill. The hydraulic drive backs the drill out automatically to clear the chips, then rapid traverses back to where it left off before dropping into feed to resume drilling. Spindle speed automatically decreases as tools on the front cross slide form the O.D., drops into lower speed as O.D. is threaded, and into another low speed as radii are formed on the finished part and on the end of the bar stock. A tool on the rear cross slide cuts off the finished part and the job is done in record time.

With its massive design, reserve power and extra spindle speeds, the new Gisholt MASTERLINE Ram Type Turret Lathe is particularly adaptable to complete automatic operation with Lynn Hydraulic Drive. Contact your Gisholt Representative. He has the complete facts—and his wide experience may point the way to more profitable operation for you.

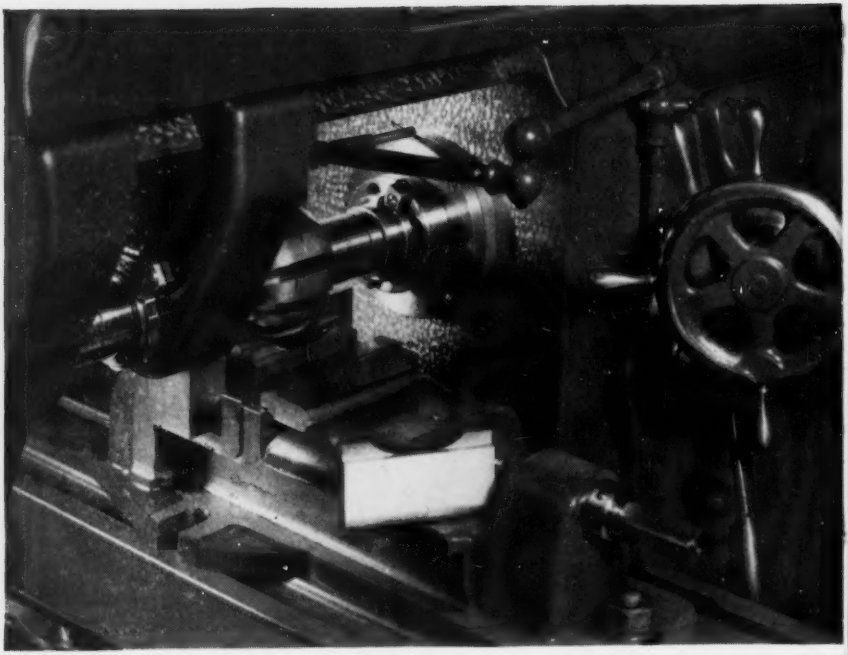
MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

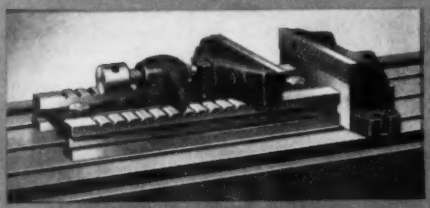
WRITE GISHOLT TODAY for new Bulletin 1174-B, covering new MASTERLINE Ram Type Turret Lathe. Also new Catalog 1182-A on Ram Type Turret Lathe with Hydraulic Drive.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

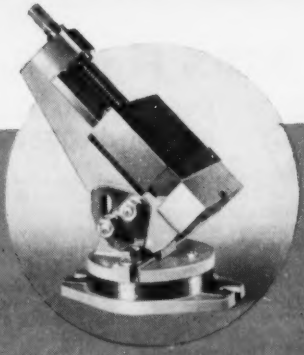
For more data circle 310 on Postpaid Card



Taking a heavy cut, $1\frac{1}{32}$" deep x $2\frac{3}{8}$" wide, in one pass. The parts are held in a CINCINNATI® No. 3 Plain Vise equipped with jaws made especially for the job.



ALL STEEL VISE. Slight swivel in movable jaw adapts it to irregularities of rough castings. Notched support bars provide quick adjustment of movable jaw. Publication No. M-1732-1.



TOOLMAKER'S UNIVERSAL VISE . . . for general toolroom work. Can be swiveled up to 90° in a vertical plane—360° in a horizontal plane. Publication No. M-1959.

CINCINNATI® Knee Type Milling machines • Bed Type Milling Mac

Cincinnati Vises . . .

for general machine shop work

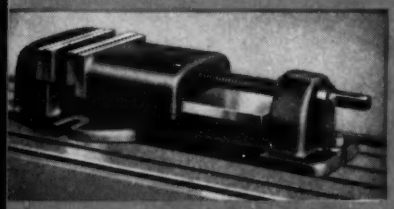
Every shop needs vises of various types. Cincinnati builds four types for general machine shop work such as milling, drilling and shaping. And Cincinnati Vises fulfill the basic requirements for equipment of this type:

1. All Cincinnati Vises . . . Plain, Swivel, Toolmaker's, and All Steel . . . are exceptionally rugged. They hold the part tightly, enabling the operator to take a heavy cut. For proof, look at the illustration (left).

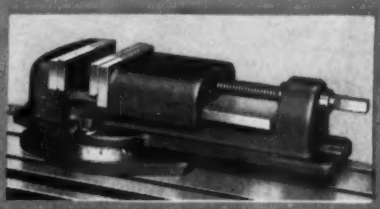
2. It's easy to make special jaws to hold odd-shaped parts, or those requiring accurate location. You can do this yourself, at a fraction of the cost of special fixtures. Complete dimensions will be found in the literature.

Complete data may be obtained by writing for literature listed for each type.

CINCINNATI



LAIN VISE. Available in Nos. 3 and 5 sizes. epth, width, and opening of jaws: No. 3— ⅛" x 6⅛" x 4". No. 5—2½" x 8⅝" x 7". ublication No. M-2030.



SWIVEL VISE. Available in Nos. 3 and 5 sizes. Specifications same as Plain Vises. Swivel base can be removed, converting the unit into a Plain Vise. Publication No. M-2030.

nking Machines • Cutter and Tool Grinders

Milling Machine Division
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

For more data circle 312 on Postpaid Card



"Our new 618's", reports Bob Pringle, General Manager of Winslow Manufacturing, Cleveland, "are what we've needed to help us stay on top as the **first name in precision control.**" With Abrasive's modern design and 'operator engineered' features, the story is the same in precision shops all over the country.

"Easy Accuracy"

That's what one Big Cleveland Gage Maker says about

ABRASIVE *six eighteen*

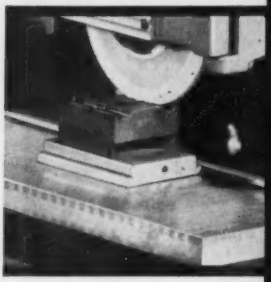
Hand Feed

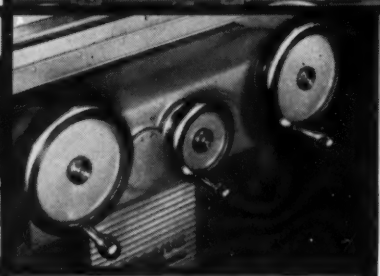
Precision

Surface Grinders

At Winslow, "the feature which most impressed our employees is the fast table travel. This makes it much easier to grind hardened material." And well it should! The 618 rides smoothly on precision anti-friction rollers. It is actuated by a smooth cable and drum drive. You get 6" of table movement with each turn of the 8" handwheel.









Bob Pringle goes on to report, "we have used the machine primarily for gage work and find that the finish is very good. It's excellent for side grinding, too." Heavy, rugged, deeply-ribbed construction plus the advantages in Abrasive's motorized spindle and wheelhead assembly make high finishes easy.

Precision and efficiency are vital at Winslow, and they found "the good repeatability of the 618 dial settings to be of special advantage." All operators appreciate the comfortable, balanced feel of the smooth recessed handwheels, available either right or left-handed. They like the comfort and convenience of the controls all located on the same waist-high plane.

It makes good sense for you, too, to look into the many profit-producing advantages of the new Abrasive 618's. Without obligation our colorful eight-page tell-all brochure is yours. **Write for it, today!**

ABRASIVE MACHINE TOOL COMPANY

Dexter Road
East Providence 14, Rhode Island

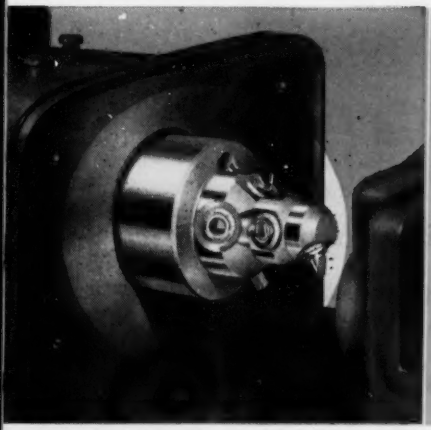
For more data circle 313 on Postpaid Card

now, pre-set tools to accurate part dimensions outside the machine with this new Microbore® System



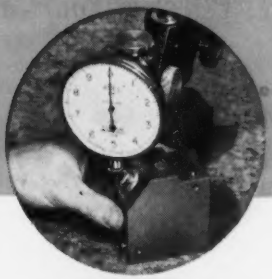
SIMPLE 4-STEP PROCEDURE

1. To set up pilot tool, insert Microbore "Pre-Set" unit in boring bar. Adjust to part dimension by trial cut and final setting using Micrometer Vernier adjustment.

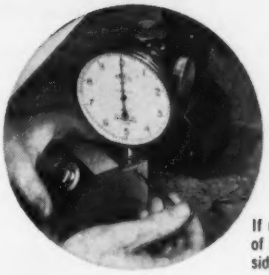




2. Remove adjusted pilot tool from the boring bar and install in the standard Microbore setting block.



3. Position indicator anvil on high point of pilot tool in setting block and adjust indicator to zero.



4. Adjust gage pin to same zero setting. Any number of additional tools may now be pre-set and interchanged with pilot for precision boring the same diameter.

If necessary to pre-set for depth of bore, tumble block to adjacent side and repeat procedure.

Eliminate trial cuts... change tools in seconds... simplify tool maintenance

Using a standard setting block and indicator, Microbore tools can now be pre-set to accurate part dimensions outside the machine and quickly locked in the boring bar or tool holder without further adjustment.

"Pre-Set" eliminates scrap parts due to trial and error set-up and greatly reduces down time for worn tool point adjustment. "Pre-Set" encourages the operator to keep sharp tools in the machine assuring greater accuracies and produces the maximum number of pieces per tool grind by minimizing breakage due to dull tools.

"Pre-Set" also makes it possible to replace worn tools without changing the entire boring bar or tool holder—eliminates the need for stand-by bars —simplifies tool grinding and maintenance.

Microbore System of "Pre-Set" tooling may be applied to boring, turning, facing and chamfering operations and is especially suited to production and automated operations where machines must maintain peak production on long runs. Write for complete information.

The DeVlieg Microbore System of Adjustable Precision Tooling includes Standard Microbore Boring Bars and Boring Bar Sets, Special Cluster Tooling, Flash-Change Tooling and Tool Holders, Flash-Change Replacement Bridgeport Spindles, Turret Lathe Turning Heads and Adjustable Boring Heads.

DeVlieg® Microbore® System

DE VLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

For more data circle 314 on Postpaid Card



HOW TO SAVE MONEY AND TIME ON SPINDLE REPAIRS

Make POPE *Your Spindle Repair Department*

POPE Repair and Rebuilding Service applies to any size, any make of anti-friction bearing Spindles — belt driven, motorized or high cycle.

POPE puts your Spindles in shape *quickly*, at lowest cost. *You* okay the cost figures before the work is done.

POPE repair work is done by the same expert craftsmen that build Pope Precision Spindles, and in the same air cleaned, air conditioned assembly department. The job will be done *right* the first time — *right* bearings, *right* preload, *right* lubrication, *right* assembly, *right* balance.

GET THIS!

Bulletin R-2 tells you *how* and *why* Pope Precision spindle repair and rebuilding service save you money and time. Clip the coupon and get a copy by return mail.



POPE MACHINERY CORPORATION
261 River St., Haverhill, Massachusetts
Please mail copy of Bulletin R-2 to:
Name .....
Company .....
Address .....
City ..... *Zone* .... *State* .....

No. 124

POPE®

ENGINEERS AND BUILDS STANDARD AND SPECIAL PRECISION ANTI-FRICTION BEARING SPINDLES FOR EVERY PURPOSE

POPE MACHINERY CORPORATION · 261 RIVER STREET · HAVERHILL, MASS.
Established 1920

For more data circle 315 on Postpaid Card

AND NOW! A HYDRAULIC

"Challenger"...

BOYAR-SCHULTZ

6 x 18 SURFACE GRINDER



ONLY $1795.00

for a 6-18 Hydraulic Surface Grinder

Since the introduction of the amazingly low priced Hand feed Boyar-Schultz Challenger Surface Grinder just a few months ago, we have been delighted with its acceptance.

So many users have requested a 6-18 machine in a low price range equipped with hydraulic longitudinal feed, that we proudly present another in an ever growing line of economy machines featuring high quality performance.

Don't buy, till you see and try this great machine.

See your nearest dealer or write

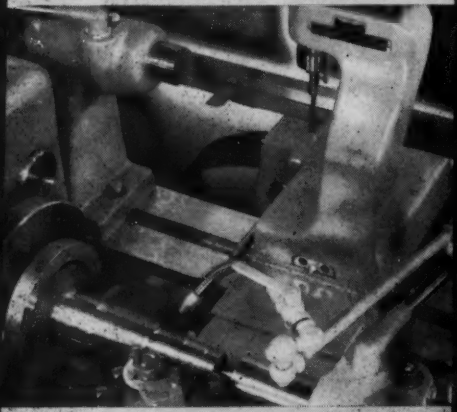
BOYAR-SCHULTZ CORPORATION

2020 South 25th Avenue, Dept. C-CH, Broadview, Illinois

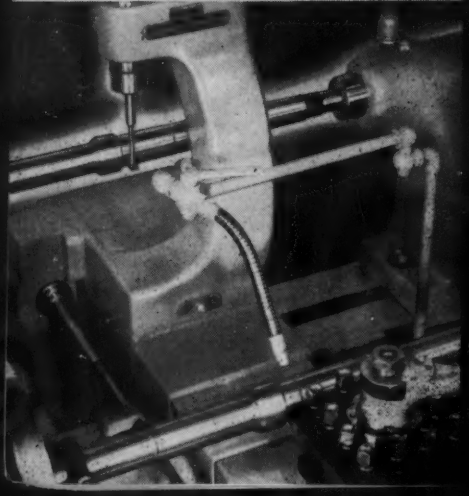
For more data circle 316 on Postpaid Card

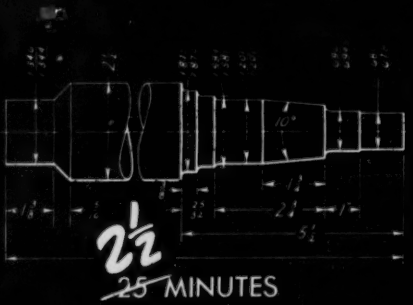


Interrupted cuts don't bother Sidney lathes. Time saved on this job was over 2 hours per piece.



You can tracer-turn from flat templates (above) or from a previously machined part or master (below).







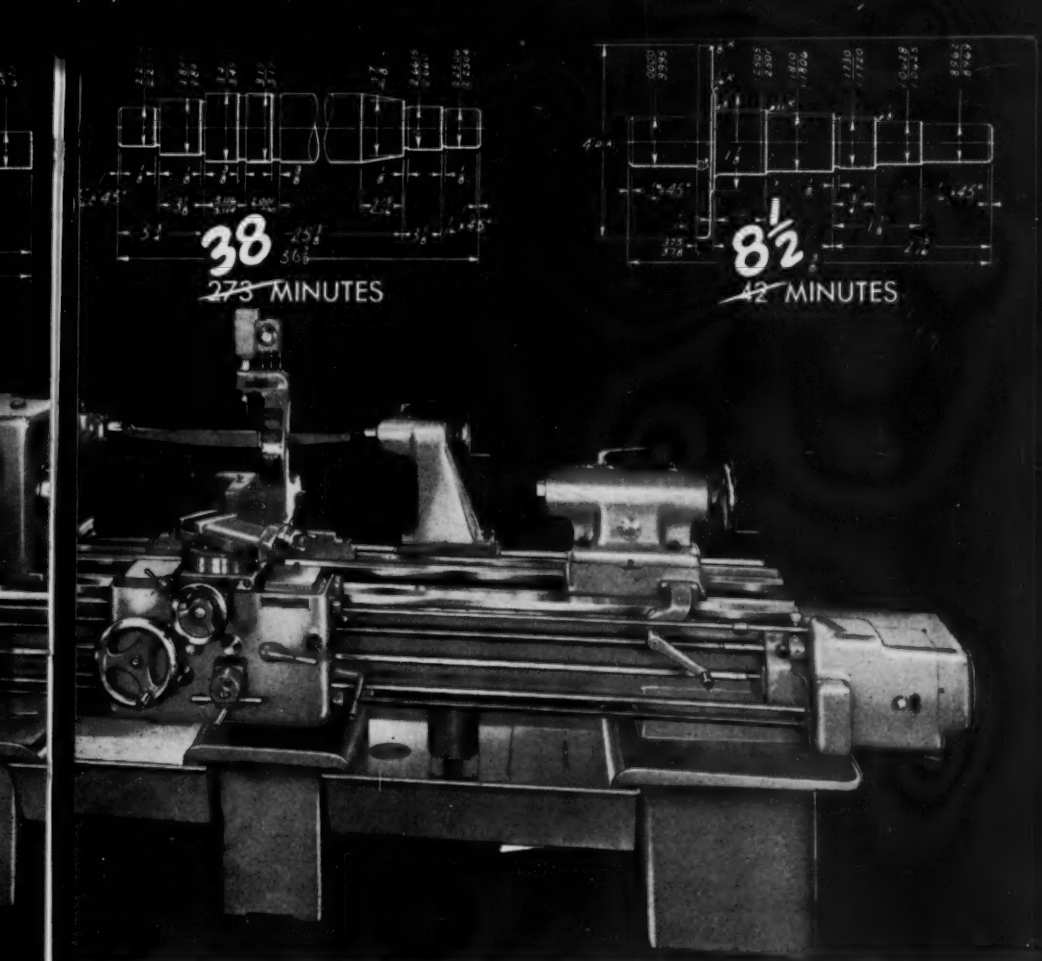
AUTOMATE

You can do both faster, more accurc on Sidney fluid-tracer lathes using e templates or masters.

Why? Here are some of the reasons:

- **Rugged high-sensitivity tracer heac**
- **Real machine rigidity with exclusiv double wall bed.**
- **Exclusive constant mesh herringbor gears throughout the head.**

And remember — Sidney tracer lathes switched to standard operations in j few seconds.



PRECISION DUPLICATING

...of short run or production parts

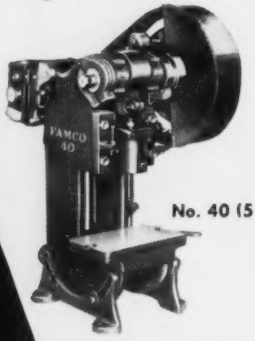
For more data circle 318 on Postpaid Card

Ask for "Fluid Tracer" Bulletin

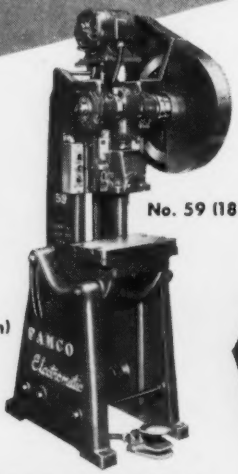
SIDNEY MACHINE TOOL CO.
SIDNEY, OHIO
Wholly owned subsidiary of Buhr Machine Tool Co.

SIDNEY

Famco power presses...



No. 40 (5 ton)



No. 59 (18 ton)

...THE PROFITABLE, MODERN WAY TO INCREASE PRODUCTION

Users of Famco Power Presses have told us they are experiencing streamlined and profitable production results with them. So can you.

The versatility and wide selection of Famco power presses—available in 50 models from 5 to 18 ton capacity—enabled them to buy the right press for the job.

Furthermore, Famco offers users a choice of 5 different clutch types (including a fine new air friction clutch-brake combination) for their presses.

You'll find at Famco the right press *at the right price* for your requirements.

So, whatever you need in power presses, see Famco first.



How to Figure Press Tonnage. It's in the Famco Press Catalog! Send for yours today!

famco machine company

3122 Sheridan Road • Kenosha 10, Wisconsin

PRESSES...AIR, ARBOR, POWER, FOOT
SQUARING SHEARS, MILLING MACHINES, BAND SAWS

For more data circle 319 on Postpaid Card

For more data on advertisement on opposite page, circle 320 on Postpaid Card →

Increased output from your carbide or ceramic cutting tools

HYPREZ OSCILLATING LAPPING MACHINE



Records prove that the Hyprez lapping technique increases tool output per grind 200% to 700% — improves speed and feeds 50% to 400% — assures finer finishes and closer tolerances on end products. Now, your carbide and ceramic cutting tools and inserts can be lapped or refinished precisely and quickly.

OSCILLATING WHEELS ASSURE PRECISION



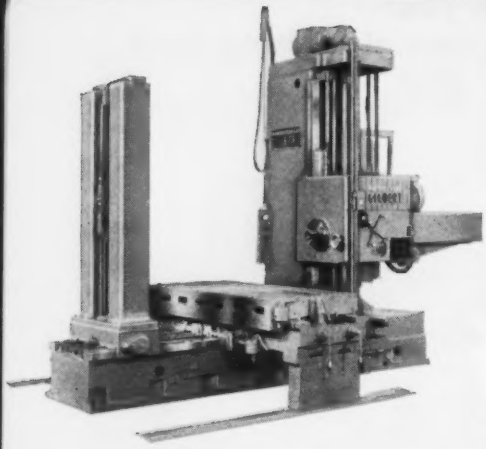
The Hyprez Finisher moves the variable-stroke lapping wheel across the edge of the tool while it is held stationary in a precisely controlled position. Protractors set exact angles for the horizontal and vertical planes; edges are straight; the geometry is not distorted. The top, lands and radii of the tool can be finished to 1 micro inch in two minutes or less.

HYPREZ DIAMOND COMPOUNDS

Charged with proper grades of Hyprez Diamond Compounds, the oscillating lapping wheels produce uniform, predictable finish—faster, scratch-free, precise.

For a demonstration or complete literature write Dept. LS-108

HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. DEARBORN ST., CHICAGO 5, ILL.



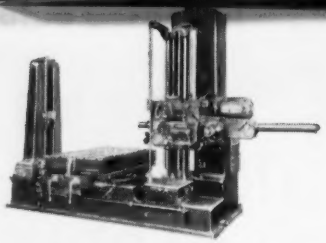
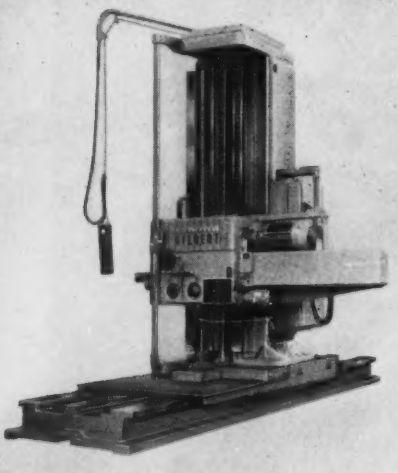
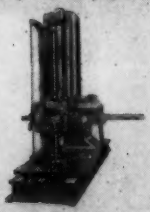


table type—All Gilbert table type boring mills feature built-in reversible motor, hardened spindle, anti-friction bearings throughout, hardened ways on bed, pressure lubrication, centralized controls (on pendant station or unit head).

Spindle diameters: 3½", 3¾", 4", 5". Morse taper or milling machine taper. Spindle speeds up to 1500 rpm. Variety of table sizes, column heights. Automatic positioning available with saddle supports.

CINCINNATI GILBERT BORING MILLS





floor type—Many types of base plates, bases, or tables can be combined with a Gilbert floor type boring mill to make it one of the most productive tools in your plant. With a revolving column, this machine can do certain types of profiling and duplicating at a fraction of the cost of other machine tools used for this type of work.

Choice of runway sizes and column heights, plus workholding units, give you a great range of work capacity. Can be adapted to existing runways.

GILBERT

THE CINCINNATI GILBERT MACHINE TOOL CO.
3348 BEEKMAN STREET, CINCINNATI 23, OHIO

For more data circle 321 on Postpaid Card



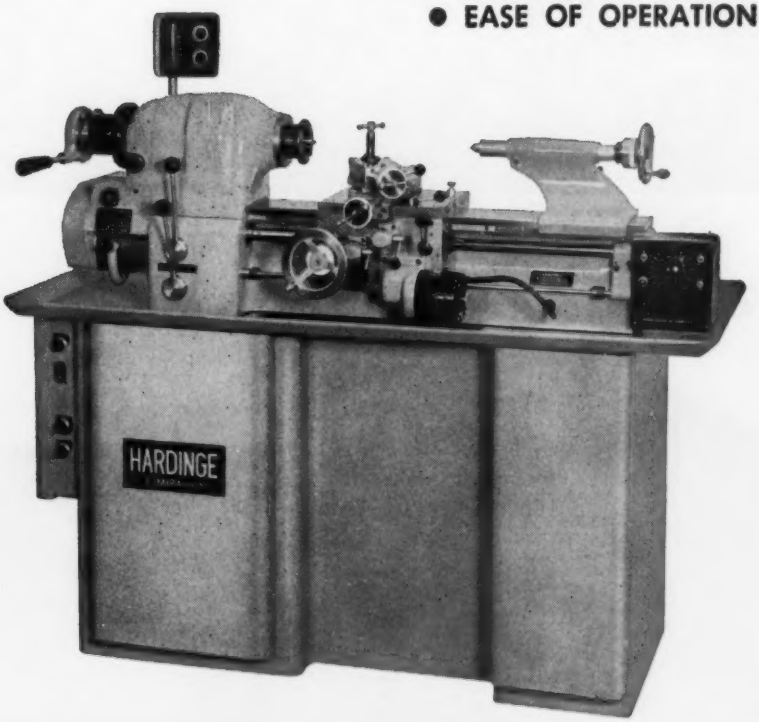
rotary tables—Hand revolving, power rotary, and power-feed rotary tables available in these sizes: 36", 50", 60", 72" square and round. Special tables can be built.

accessories—Milling attachments, facing heads, boring bars, end measuring instruments, etc., available at competitive prices.

HARDINGE
ELMIRA, N.Y.

"Outstanding Tool Room Lathe"

- EXTREME ACCURACY
- HIGH SPINDLE SPEEDS
- EASE OF OPERATION



Model HLV
TOOL ROOM LATHE

Write for Bulletin HLV

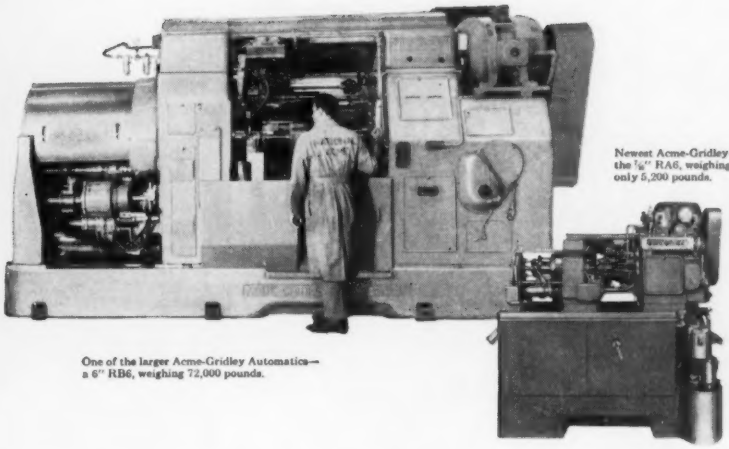
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York, N. Y.
For more data circle 322 on Postpaid Card



Produce parts like these on





Newest Acme-Gridley—the 1⅛" RA6, weighing only 5,200 pounds.

One of the larger Acme-Gridley Automatics—a 6" RB6, weighing 72,000 pounds.

ACME-GRIDLEY automatics . . .

FORGET SECONDARY OPERATIONS!

Most parts machined on Acme-Gridleys are *completed* on Acme-Gridleys. Using these Automatics, you eliminate costly rehandling and, in many instances, avoid a sizeable second-machine investment.

The advantage applies to parts weighing fractions of ounces or hundreds of pounds. And the wide-open tooling zone of every Acme-Gridley lends itself to a broad range of installations limited only by the tool engineer's ingenuity. It means that, for sheer capacity range, no line of automatic production equipment in the world equals Acme-Gridley.

If you produce parts like the ones illustrated, then Acme-Gridley Automatics must be in your present plans. Our representative can give you expert assistance without obligation.

National Acme

THE NATIONAL ACME COMPANY, 183 E. 131st ST., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

For more data circle 324 on Postpaid Card

Here's a MARVEL HIGH-SPEED-EDGE Hack Saw Blade we wouldn't sell you!



This blade **could** have been packaged and shipped as a genuine MARVEL High-Speed-Edge Blade . . . and it **might** have performed to a customer's satisfaction. Instead, it was rejected and will be scrapped because inspection revealed a minute imperfection.

There's nothing unusual about this. Certainly, other hack saw blade manufacturers inspect their products, and undoubtedly reject blades for one reason or other, because they are trying to market the best blades they know how to make.

And that's the point—here at MARVEL, where the composite blade was invented and perfected over 30 years ago, we believe we know more about making high-speed-edge hack saw blades than any other maker. We've been at it longer, and the unequalled performance of MARVEL Blades on every kind of material is evidence that we're right.

Use MARVEL Blades on your power hack saws with perfect confidence that they have no equal. You can get MARVEL Blades at your nearby Industrial Distributor.



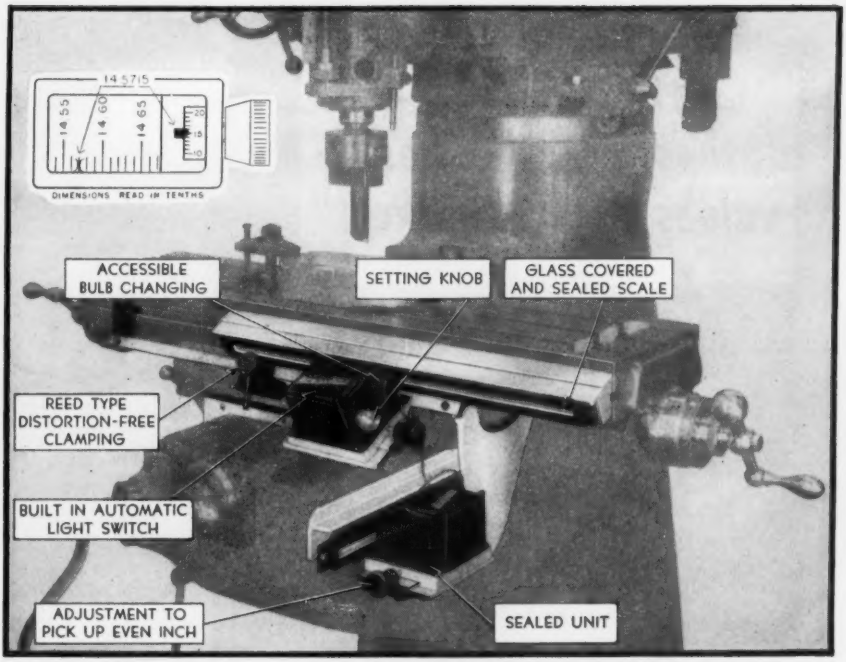
Write for the new MARVEL Cutting Tool Bulletin.

FB-H32

MARVEL Metal Cutting SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO.
5700 W. BLOOMINGDALE AVE. • CHICAGO 39

For more data circle 325 on Postpaid Card



The New Bridgeport OPTICAL SYSTEM

. . . fast, accurate and efficient

By using the NEW BRIDGEPORT Optical System it is now possible to read a figure on the scale as it appears on the working drawing. It is not necessary to add any figures or make any vernier estimations. The operator's skill in reading a single line is all that is required.

The new BRIDGEPORT Optical System is an accurate and time-saving method for quick positioning of table in both planes.

The Optical System is installed at factory on new machines and is easily installed in the field on any BRIDGEPORT MILLER already in service.

Further facts are available through your nearest dealer or through us direct.

Bridgeport MACHINES, INC.
Bridgeport, Connecticut
Manufacturers of High Speed Milling Attachments and Turret Milling Machines

For more data circle 326 on Postpaid Card



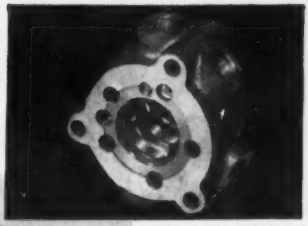
HERE'S PROOF OF PERFORMANCE . . .

"Without question, Clausing 12¾" Lathes give you more for the money than any lathe of comparable size or price. We especially like their heavy construction which enables us to take deeper cuts, and hold tolerances better on repetitive operations." This statement by Bill Rogie, Flynn Manufacturing Co. is typical of the reports we receive from Clausing owners everywhere. Here are a few of the reasons why:

Flame hardened bed ways are standard equipment *at no extra cost* on Clausing lathes. Headstock, apron and quick-change box are totally enclosed and gears and shafts travel in bath of oil – another important exclusive. Spindle is forged steel with 1⅝" bore, hardened and ground ASA – L-00 tapered key-locked nose. Spindle turns on Timken "Zero-Precision" tapered roller bearings. Tail stock has No. 3 MT ram.

Compare *all* the features. Compare price. See for yourself why Clausing is acclaimed the outstanding lathe value – the lathe for *your* shop.

CLAUSING DIVISION *Write for Free Literature*
ATLAS PRESS COMPANY
10-110 N. PITCHER ST. • KALAMAZOO, MICHIGAN
For more data circle 327 on Postpaid Card



CONTROL VALVE
MAT: Cast Iron
DIA: 1.625″
TOL: .00025″
STOCK: .0015″
PROD: 40/HR

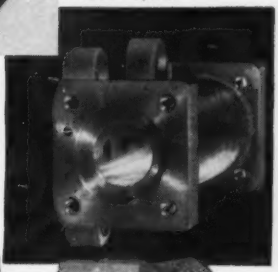
Bore-Sizing Problems? Limited Budget?

...solve **BOTH** with

SUNNEN® HONING



CIRCUIT BREAKER LATCH
MAT: Lam. Steel 60 Rc
DIA: .500″
TOL: .0005″
STOCK: .0015″
PROD: 45/HR



CONTROL VALVE BODY
MAT: Cast Bronze
DIA: 1.000″
TOL: .0001″
STOCK: .003″
PROD: 16/HR

You may be reluctant to make a large capital investment at this time, in spite of a pressing need to break production bottlenecks.

However, there's no need to wait! You can solve your problems with a Sunnen Honing Machine NOW . . . without tying up your operating capital.

Average cost of a Sunnen Honing Machine, with tooling runs about $1,000.

These versatile, low-cost machines are guaranteed to hold .0001″ accuracy, with controlled surface finishes as fine as 2 micro-inches. And—they can outproduce internal grinders . . . especially on small work. Range: ⅛″ to 2⅝″.

Many manufacturers have bought these universal machines to keep initial investment and cost per piece low.

One of our field engineers will be glad to demonstrate a machine in your plant, on your parts, without obligation.



7937

WRITE US FOR MORE INFORMATION NOW
Check Reader Service Card

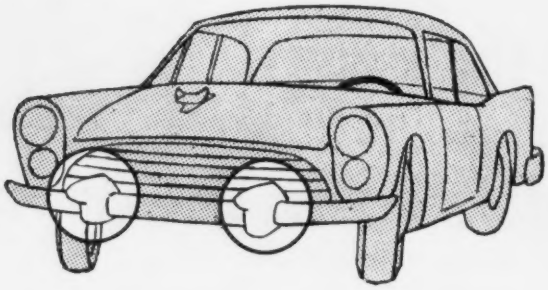
SUNNEN PRODUCTS COMPANY
HONING

7928 [illegible] Ave. • St. Louis 17, Mo.
Canadian Factory: Chatham, Ontario

For more data circle 388 on Postpaid Card

HY-PRO specialists deliver 100 times longer tap life

with a little difference in design





The standard spiral point tap formerly used for tapping an automobile bumper bracket lasted for 100 holes or less, due to breakage. The cause was misalignment which could not be corrected without prohibitive expense for jigs, and for special controls in preceding operations. HY-PRO specialists designed a no-flute, 3-spiral groove tap with special heat-treatment which boosted production to 10,000 holes per tap — with no change in job specifications. Result —

98% SAVINGS IN TAP COST.

The jobs where tap life can be increased a hundredfold are obviously exceptional. But it can happen, as this case proves, even in the cost-wise automobile industry. That's why it pays to question tap costs on any job.

Why not find out if your tap costs are as low as they can be? It costs nothing to consult HY-PRO specialists. For complete details, write Dept. G

HY-PRO

REG. U. S. PAT. OFF.

The Tap Engineering Specialists

ASK FOR STOCK LIST OF SPECIAL TAPS AVAILABLE FOR IMMEDIATE DELIVERY

CALL YOUR LOCAL **HY-PRO DISTRIBUTOR** FOR STANDARD TAPS FROM STOCK

HY-PRO TOOL COMPANY · NEW BEDFORD, MASS., U.S.A.

For more data circle 329 on Postpaid Card



Lodge & Shipley POWERSHIFT PRESELECTOR

GIVES PRODUCTION PLUS

- **TIME SAVING**
- **INCREASED TOOL LIFE**
- **FINER FINISH**
- **DECREASED EFFORT AND ERROR**
- **PROVISION FOR THE FUTURE**

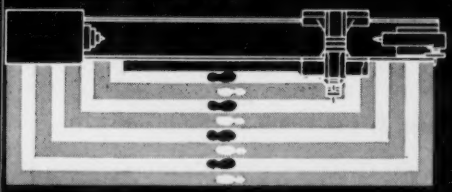
These important factors, offered by the Lodge & Shipley POWERSHIFT PRESELECTOR Lathe, should be considered in selecting your new lathe.

A SINGLE DIAL . . . COMPUTES! REMEMBERS! SHIFTS! You merely rotate cut speed dial to desired speed (dial computes speed if desired) . . . then, when preset speed is needed, shift to it immediately at the apron! • One speed can be preset; up to six others "programmed" with handy indicator tabs. A Lodge & Shipley representative will be glad to explain fully. You'll find his name in the telephone yellow pages. Or, for detailed literature, write:

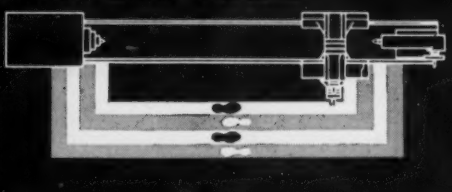
THE LODGE & SHIPLEY CO., 3058 COLERAIN AVE., CINCINNATI 25, OHIO

With a long bed lathe and a job requiring 4 speed changes, an OPERATOR CAN SAVE ALMOST 50% OF HIS "HIKING TIME"

CONVENTIONAL HEADSTOCK
4 trips to headstock 4 to apron



POWERSHIFT PRESELECTOR
only 2 trips to headstock only 2 to apron!

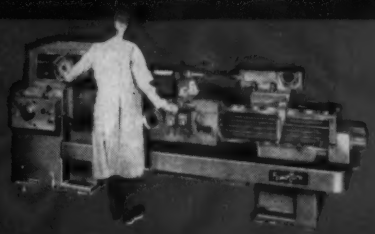


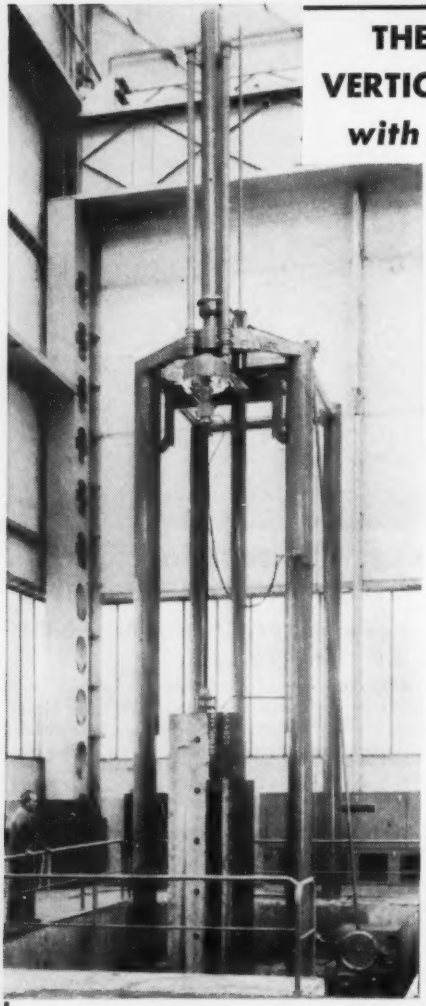
more than ever . . .

Lodge & Shipley

your LODGE-ical choice

For more data circle 330 on Postpaid Card





THE WORLD'S LARGEST VERTICAL HONING MACHINE *with the "feather touch"*

Hones a hydraulic cylinder 11" in diameter and 10 feet long to ± .0001" for size and concentricity.

Large . . . but accurate! High as a five story building, with 144" stroke and diameter capacity up to 30". Work table can accept loads up to 80,000 lbs. . . . tremendous!

Fulmer Honing Machines

DO MORE...COST LESS

Manual or automatic feed.

Write for bulletin on honing and for free computer.

C. ALLEN FULMER CO.,
Dept. S, 107 E. 4th St., Cincinnati 2, O.

FULMER *the World's Best* **HONING EQUIPMENT**

For more data circle 331 on Postpaid Card

Brehm trimmed in one press stroke



Slow, costly, multiple "horn" operations and distorted edges due to "pinch" trimming can be eliminated by a Brehm Die. Operating on principles different from ordinary trimming methods, the Brehm "Shimmy" Die with angular cams causes the shearing edges to cut *four ways in a single* press stroke.

Materials, thickness, shapes and sizes look alike to a Brehm "Shimmy" Die. Shells can be trimmed that are drawn from sheet gold, silver, stainless steel, mild steel, copper, brass, zinc, aluminum, fiber and the flash from some types of moulded articles made of rubber and similar material. Metal thickness varying from .005 brass to .250 steel can be trimmed. Shell sizes vary from metal ferrules for fountain pen barrels to electric refrigerator doors. Clean, flat, burr free edges are assured. Edge contours can be straight or curved, with multiple notches and projections.

When model changes alter the part design, or if you wish to handle an entirely new part, you only need to substitute cutting adapters.

Send part prints to your tool room in Dayton for quotation on Brehm "Shimmy" and related dies, such as blank, form, pierce.

VULCAN TOOL COMPANY · THE SHIMMY DIE · REGISTERED U.S. PATENT OFFICE

ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO., YOUR TOOL ROOM IN DAYTON
BREHM DIE DIVISION • 732 LORAIN AVENUE • DAYTON 10, OHIO

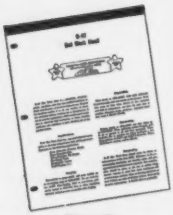
VULCAN tools

For more data circle 332 on Postpaid Card



Close-up view of "one-use" rock drill bit and the B-47 die ring which press forges it.

INCREASED ROCK DRILL BIT PRODUCTION 330%



Write for BLUE SHEET on B-47

This concise four-page folder gives all needed handling and shop treatment details on B-47. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. Ask for your copy.

ADDRESS DEPT. MS-10

A midwestern company increased their production of rock drill bits from 1500-3000 per die ring to a consistent total of more than 10,000 bits by switching to Allegheny Ludlum's B-47 die steel.

But of even greater importance, they claim, is the dependability of B-47:

"The less breakdowns we have, the less die changes we must make and the better production we get. Also, we are able to plan our production on the basis of being sure of the reliability of our dies."

Continued high production is necessary to make these special "one-use" bits competitive in today's market. B-47 practically eliminates unscheduled downtime caused by die failure.

A-L's B-47 is a tough hot work steel. It has excellent resistance to shock and abrasion at elevated temperatures. Also, it is especially good for those applications which require ruggedness at relatively high hardnesses.

Check your A-L representative today about Allegheny Ludlum's complete line of tool and die steels—a grade for every job. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh, Pa.***

For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL® PINE TOOL STEELS SINCE 1854

WOW 0647

For more data circle 333 on Postpaid Card

→ Use this Postpaid Card for requesting more information on products described and advertised →



↓ Use this Postpaid Card for requesting more information on products described and advertised ↓

READER SERVICE CARD **OCTOBER, 1958**

Your Name_____ Your Title_____

Company Name_____

Company Address_____

City_____ Zone_____ State_____

Products Manufactured_____ Number of Plant Employees_____

modern machine shop

431 Main Street, Cincinnati 2, Ohio

DO NOT WRITE IN THESE SPACES

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue

EDITORIAL ITEMS

1	26	51	76	101	126	151	176	201	226	251	276
2	27	52	77	102	127	152	177	202	227	252	277
3	28	53	78	103	128	153	178	203	228	253	278
4	29	54	79	104	129	154	179	204	229	254	279
5	30	55	80	105	130	155	180	205	230	255	280
6	31	56	81	106	131	156	181	206	231	256	281
7	32	57	82	107	132	157	182	207	232	257	282
8	33	58	83	108	133	158	183	208	233	258	283
9	34	59	84	109	134	159	184	209	234	259	284
10	35	60	85	110	135	160	185	210	235	260	285
11	36	61	86	111	136	161	186	211	236	261	286
12	37	62	87	112	137	162	187	212	237	262	287
13	38	63	88	113	138	163	188	213	238	263	288
14	39	64	89	114	139	164	189	214	239	264	289
15	40	65	90	115	140	165	190	215	240	265	290
16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
20	45	70	95	120	145	170	195	220	245	270	295
21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
23	48	73	98	123	148	173	198	223	248	273	298
24	49	74	99	124	149	174	199	224	249	274	299
25	50	75	100	125	150	175	200	225	250	275	300

ADVERTISEMENTS

301—Front Cover					410	435	460	485	510	535	560	585	610
302—Inside Front Cover					411	436	461	486	511	536	561	586	611
303—Inside Back Cover					412	437	462	487	512	537	562	587	612
304—Back Cover					413	438	463	488	513	538	563	588	613
305	326	347	368	389	414	439	464	489	514	539	564	589	614
306	327	348	369	390	415	440	465	490	515	540	565	590	615
307	328	349	370	391	416	441	466	491	516	541	566	591	616
308	329	350	371	392	417	442	467	492	517	542	567	592	617
309	330	351	372	393	418	443	468	493	518	543	568	593	618
310	331	352	373	394	419	444	469	494	519	544	569	594	619
311	332	353	374	395	420	445	470	495	520	545	570	595	620
312	333	354	375	396	421	446	471	496	521	546	571	596	621
313	334	355	376	397	422	447	472	497	522	547	572	597	622
314	335	356	377	398	423	448	473	498	523	548	573	598	623
315	336	357	378	399	424	449	474	499	524	549	574	599	624
316	337	358	379	400	425	450	475	500	525	550	575	600	625
317	338	359	380	401	426	451	476	501	526	551	576	601	626
318	339	360	381	402	427	452	477	502	527	552	577	602	627
319	340	361	382	403	428	453	478	503	528	553	578	603	628
320	341	362	383	404	429	454	479	504	529	554	579	604	629
321	342	363	384	405	430	455	480	505	530	555	580	605	630
322	343	364	385	406	431	456	481	506	531	556	581	606	631
323	344	365	386	407	432	457	482	507	532	557	582	607	632
324	345	366	387	408	433	458	483	508	533	558	583	608	633
325	346	367	388	409	434	459	484	509	534	559	584	609	634



Wh
DO
J &
elin
Fin
ing
bor
Fas
Mo
adj
for
Mo
for
wo

Oct

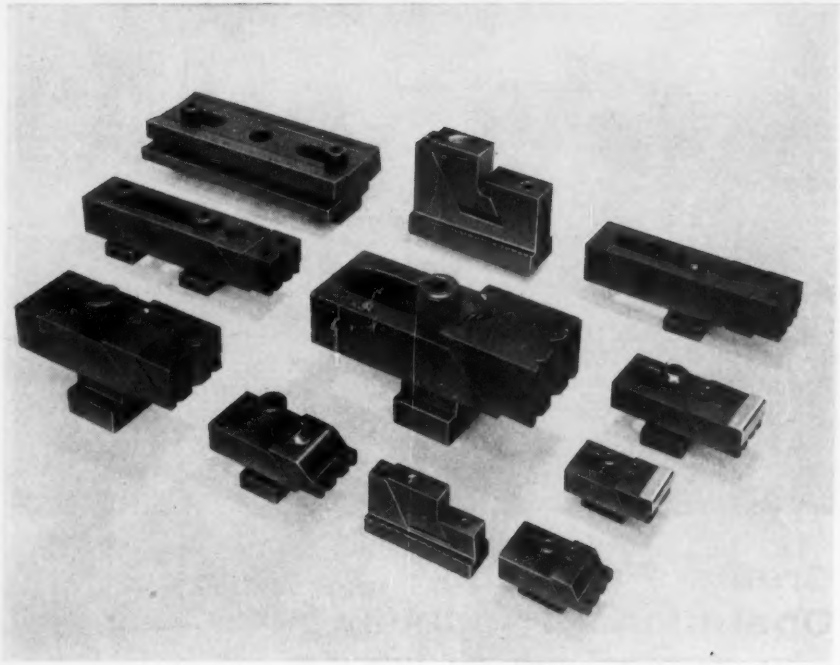
FIRST CLASS
PERMIT No. 1702
CINCINNATI, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

modern
machine
shop

431 MAIN ST.
CINCINNATI 2, OHIO



Where you can get . . .

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

Faster Set-up with any of the 5 Models of J & S Jaw Clamps—one adjusting screw has a holding force of 2½ tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

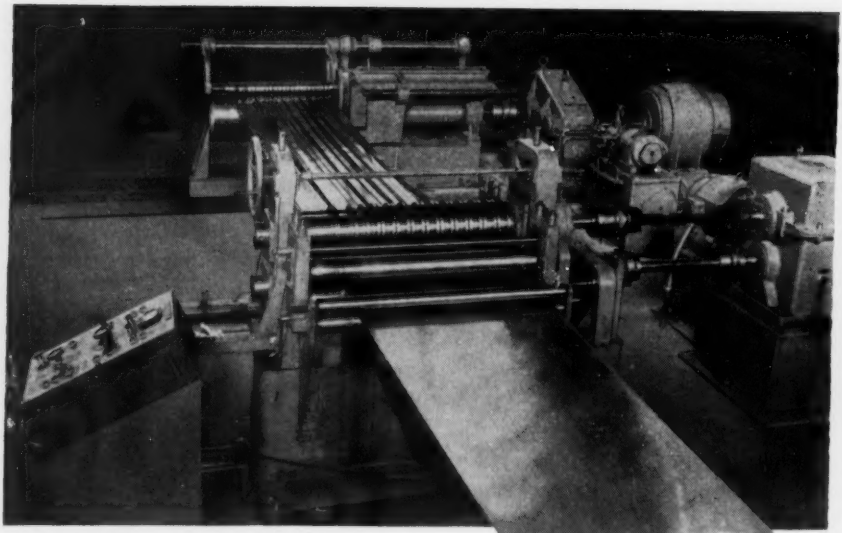
Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems — no interference with measuring tool readings.

See your industrial distributor or write today for free literature.

WHEEL DRESSERS · J&S TOOL CO. INC · JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES · **CLAMPCUT** · SINE BARS ·

J & S TOOL CO., INC. | **871 DORSA AVE. LIVINGSTON, NEW JERSEY**

For more data circle 334 on Postpaid Card



Greater Profit and Operational Flexibility with a YODER SLITTER

Even if you use less than 100 tons of varied strip sizes per month, it will pay you to investigate the savings that are possible through the operation of a Yoder slitter. Savings per ton increase rapidly as coil size and width of strands decrease . . . so much, that under average operating conditions, a slitter will pay for itself in a few months.

From a small stock of standard mill-width coils, a Yoder slitting line enables you to meet unexpected demands, or to supply "special" width slit strands in a matter of a few hours. This flexible operation increases plant efficiency, resulting in savings of time and money through simplified production planning and greatly reduced strip inventories.

The Yoder line includes slitters of every size and capacity for coil or sheet stock. Send for the all-new, 1958 edition of the Yoder Slitter Book. It is a comprehensive text on the mechanics and economics of slitter operations with time studies, cost analyses, and other valuable data. Write to:

THE YODER COMPANY • 5532 Walworth Avenue • Cleveland 2, Ohio

VISIT BOOTH 2770 METAL SHOW, CLEVELAND, OHIO, OCTOBER 27 - 31

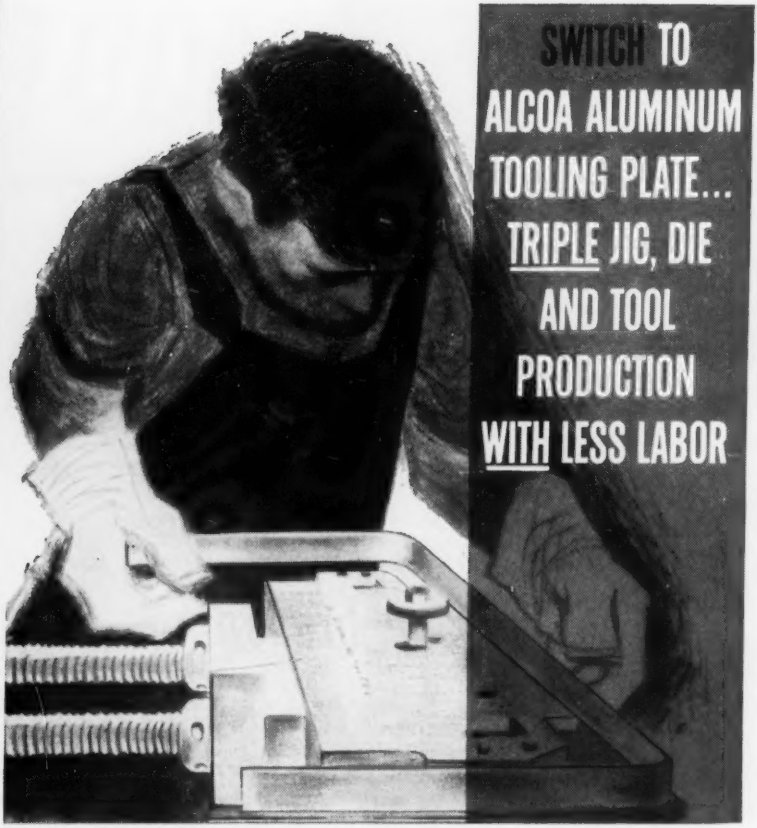
ENGINEERING YODER MANUFACTURING

ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

For more data circle 335 on Postpaid Card



That's a mighty big order for any shop, but Alcoa® Aluminum Tooling Plate and Alcoa Tool and Jig Plate can fill it. Here's a case in point. You can make three times as many core blower plates from 100 pounds of Alcoa Tool and Jig Plate as compared to the number obtainable from 100 pounds of conventional tooling plate. Now add these other savings: aluminum machines three times faster with better accuracy . . . machines and tools last longer . . . less maintenance is required.

Slash Labor Costs as Much as 60 Per Cent. Along with aluminum's high-speed machining characteristics, you get all-important light weight for savings in handling. Because it weighs but one-third as much as iron or steel, changeovers are reduced to a one-man job. An aluminum jig takes less time and work to open, close, move, store or set up.

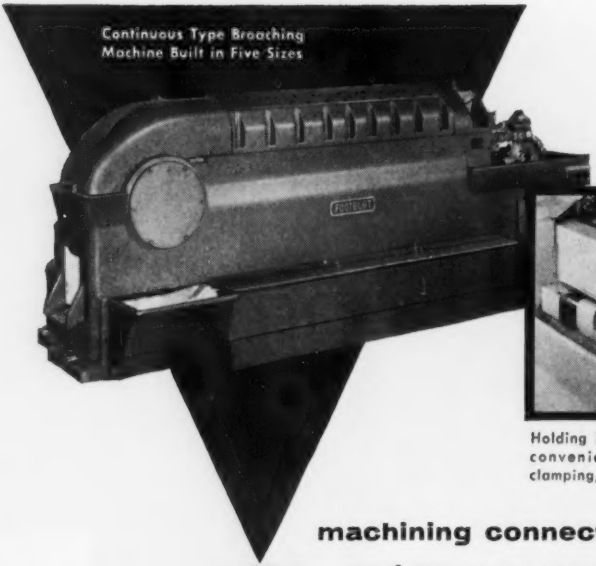
Call Your Local Alcoa Distributor. Order locally from a wide selection of sizes and gages, cast or rolled. Alcoa Tool and Jig Plate is ideal for high-precision tooling needs. Alcoa 6061-T6 Tooling Plate is a wrought aluminum plate for high-strength utility requirements.

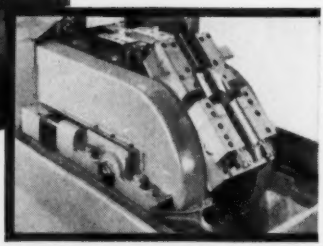
Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

Aluminum Company of America, 952-K Alcoa Bldg., Pittsburgh 19, Pa.

For more data circle 336 on Postpaid Card





Holding Fixtures are designed for quick, convenient loading, with automatic clamping, unclamping and unloading.

machining connecting rods and caps an opportunity for

Surface broaching



Surface Broaching is a modern machining method that in many cases shows reduced costs through higher production, finish to closer tolerance, and low tool maintenance costs. If you machine large quantities of duplicate parts we will be glad to work with you on the possibility of adopting Footburt Surface Broaching Machines. Send us blueprints and hourly production requirements for our recommendations.

THE FOOTE-BURT COMPANY CLEVELAND 8, OHIO

Detroit Office: 24632 Northwestern Hwy., Detroit 35, Mich.

Write for Circular No. 503

FOOTBURT

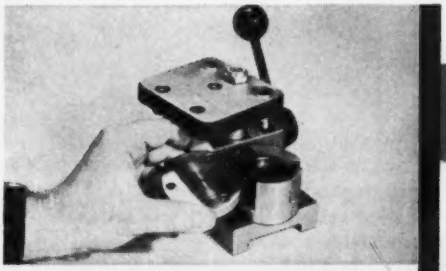
PIONEERS IN SURFACE BROACHING

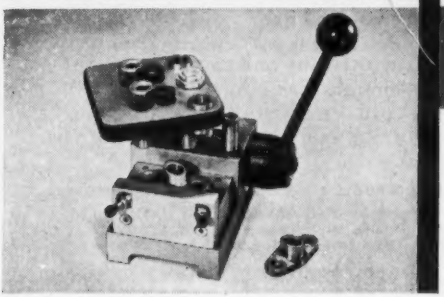
For more data circle 337 on Postpaid Card

TOOL QUICKLY

FOR LONG OR SHORT RUNS

Lift Swing Drilling Fixture
Saves Precious Tooling-Up Time
and Fixture Costs





Low Initial Cost

Separately tooled top plates can be used on the same fixture base.

Swing-away top plate permits faster drilling operations, and provides tremendous tooling-up advantages. Take advantage of the "ease of tooling" features.

Write for Lift Swing Tooling Suggestions. Bulletin LS-58

ACCURATE BUSHING CO.

ASA Standard Drill Bushings • Precision Parts • Lift-Swing Drilling Fixtures

442 NORTH AVE., GARWOOD, N. J.

For more data circle 338 on Postpaid Card

For fast, economical cutting of flat metal shapes there are

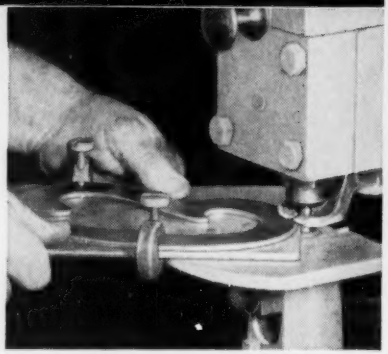
7 MODELS OF Campbell Nibbling Machines

...with cutting capacities ranging from 3/32″ mild steel for **MODEL 0** machine to 1/2″ mild steel for **MODEL 530**, in sheet sizes from 16″ or less, to 72″.

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.





Economical "throw-away" punch and die

• CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

...for any and all kinds of shapes

...for either inside or outside cuts

...with no distortion of material—no internal strains —no invisible fractures—no burr

...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of CAMPBELL NIBBLING MACHINE Capacities

Campbell Nibbler Model #	Sheet Width	WORKING CAPACITY Sheet Thickness Mild Steel	Alloy Steel	Strokes per Minute
0	16″	3/32″	1/16″	900
1A	20″	3/16″	1/8″	375-650
430	60″	3/8″	1/4″	350-525
436	72″	3/8″	1/4″	350-525
530	60″	1/2″	5/16″	350-525
2524	48″	1/4″	3/16″	375-650
2536	72″	1/4″	3/16″	375-650



Send for this catalog for complete information on this versatile production and experimental tool

CAMPBELL NIBBLERS

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

ACCO

Dept. 931, 230 Park Avenue, New York 17, N. Y.

For more data circle 339 on Postpaid Card



Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

LOW COST • Priced at less than $500, delivered.

BIG CAPACITY • Up to 2″ square solids, 3½″ O. D. pipe and tubing, 3″ angle iron, and 4″ channels. Wheel oscillation, an exclusive feature in this price range, provides this *above-average* capacity.

SPEED • Cuts a 2″ x 2″ hardened steel bar in 16 seconds . . . practically any metal at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

VERSATILITY • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

ECONOMY • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. Little or no set-up time required.

NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL machine and wheels. If not, let us know and we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for **Bulletin DH-106.**

ALLISON-CAMPBELL DIVISION
AMERICAN CHAIN & CABLE

ACCO

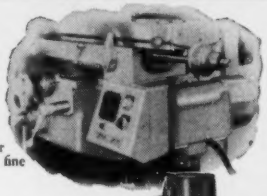
931-S Connecticut Avenue, Bridgeport 2, Conn.
For more data circle 340 on Postpaid Card

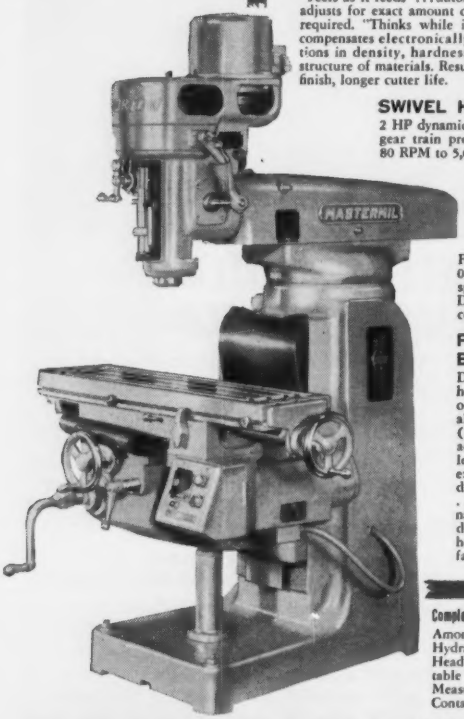
Eventually you'll buy a GORTON MASTERMIL

here's why

DYNA-DRIVE
"The Torque-Thinking" Table Feed

"Feels as it feeds"... automatically adjusts for exact amount of torque required. "Thinks while it works", compensates electronically for variations in density, hardness, molecular structure of materials. Result? Superbly fine finish, longer cutter life.





SWIVEL HEAD

2 HP dynamically balanced motor with belt and gear train provides wide range of speeds from 80 RPM to 5,600 RPM. Head swivels 90° left or right, head, ram and turret rotate 180°. Cross movement 14 inches. Push button starting.



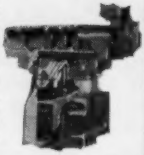
DOWN FEED INFINITELY VARIABLE

Feeds may be varied infinitely from 0" to 5" independent of spindle speeds. High efficiency belt drive. Direction and rate of feed separately controlled.



PERMANENT ACCURACY BUILT-IN

Distortion is prevented by extra heavy one-piece column cast with over-size ribbing . . . extra heavy alloy steel turret clamping bolt (1⅜" dia) with 3-point clamping action . . . heavy dovetail way full length of vertical column face . . . extra large table, knee and 24" saddle (2" longer than table travel) . . . square lock bearings with long, narrow guide between knee and saddle . . . positive locks . . . extra heavy feed screws . . . bearing surfaces hand-scraped.



Complete Versatility Through Attachments Built-In or Field Installed.

Among such equipment is, Trace-Master Hydraulic Tracer Control, Duplicator Tracer Head and/or Table with base, saddle and table in one unit, 6" Raising Block, End Measuring Rods and Dial Indicators, Self-Contained Coolant System.



Write for Bulletin 2699-1710.

© 1958 George Gorton Machine Co.

GORTON

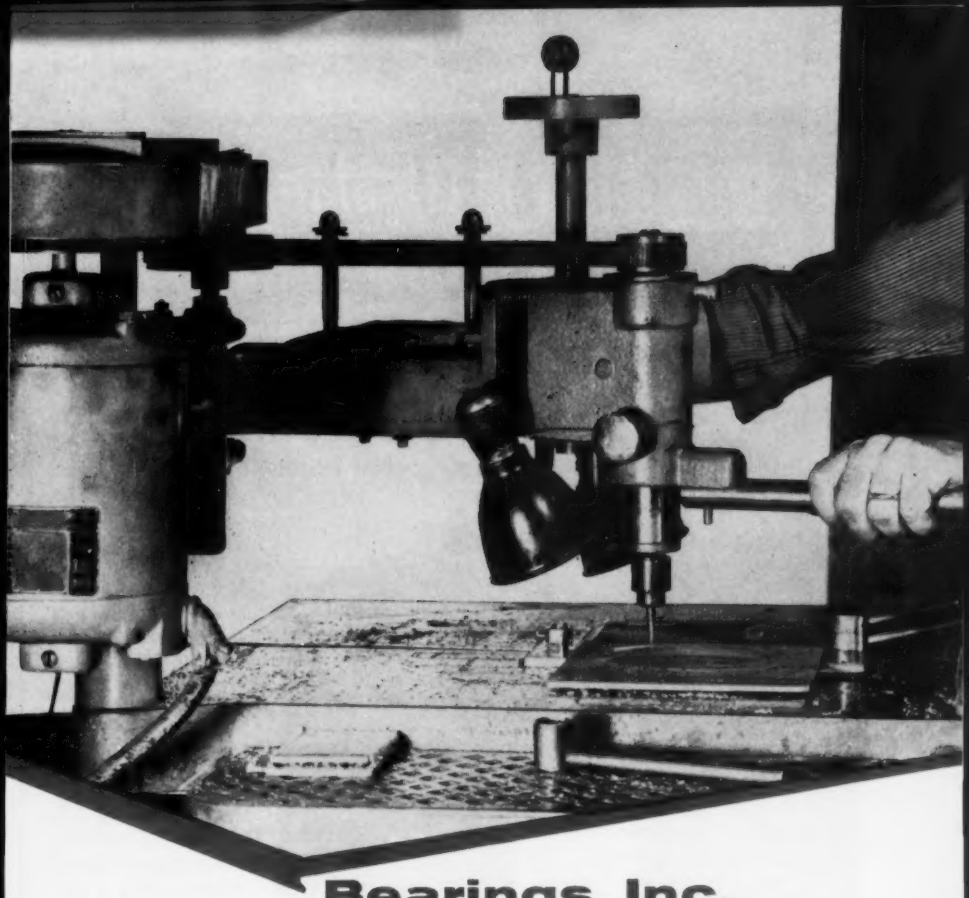
GEORGE **GORTON** MACHINE CO.

1710 RACINE STREET • RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators—standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle 341 on Postpaid Card A8-1008



Bearings, Inc.

repaired, serviced and returned
his high speed spindle in just 48 hours!

nd we can give *you* this kind of service when you need This is a spindle on a router operating at 10,000 R.P.M. super-precision bearings were failing and the spindle ld no longer perform satisfactorily.

customer is located in Mansfield, Ohio, and at 10 a.m. a Sunday the spindle was placed on a bus headed for veland. The Bearings, Inc. Spindle Repair Department in veland met the bus and work began immediately to bring spindle back to its original accuracy and operating efficiency. The customer received the completely overhauled spindle the following Tuesday. Repair and transportation time—less than 48 hours!

Bearings, Inc. complete Spindle Repair Department is another service we offer our customers and all high speed grinding and precision bearings repaired by us will be returned to you, not in weeks *but in hours*—A service time you won't find equalled anywhere! Write or call our branch nearest YOU.

viding bearing service in the North➤ **BEARINGS, INC.**

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo, Bolanrol Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and

in the South➤ **DIXIE BEARINGS, INC.**

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville

For more data circle 342 on Postpaid Card

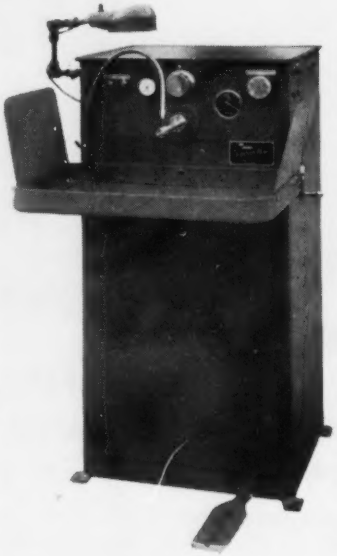
Never before a honing machine like this new Model "AM" by Superior . . .

A new equipment that will help all plants shorten honing time, achieve a better finish on most types of metals, hard or soft, and realize much longer stone life.

Combines the rugged dependability and economical precision and speed which make it ideal for production runs, tool room work and salvage operations.

The only single machine which affords infinitely variable speeds of from 250 to 1400 rpm. Sealed ball bearing spindle. Tachometer permits accurate speed setting. Dial indicator available. Large disc clutch and disc brake.

An exclusive feature is the 14-gallon capacity coolant tank which is removable for easy cleaning. Coolant tank, drive, and ½ H.P., 110-volt, 60 cy., single phase motor completely enclosed in heavy steel base which has louvered cover to provide ample ventilation.



Employs standard V-belt drive and provides automatic tensioning. The filter tray has three settling baffles and burlap filter. Overall size only 48" high, 28" wide and 36" deep. The top is formed into a convenient tray.

Universal adjustment of light. All on-off switches are mounted on the front of the machine for maximum convenience.

"You get so much more when you get Superior Honing Machines"

Send today to Honing Headquaters for literature and prices.

SUPERIOR HONE CORPORATION

1615 ELRENO STREET **ELKHART, INDIANA**

For more data circle 343 on Postpaid Card

Stability

must be more than skin deep!



Cincinnati Sub-Zero insures maximum stability of metals . . . even at supersonic speeds!

MODEL
4SR-120-64

New 64 cu. ft. production unit brings 350 lbs. of AM-350 stainless steel per hr. from ambient to minus 120° F.

Speeds of thousands of miles per hour . . . murderous split-second temperature and altitude changes . . . today's aircraft, rockets and missiles survive an almost unbelievable assault in the vital race for preparedness.

Whether or not your products are involved in this "race", Cincinnati Sub-Zero production chilling or environmental test units can help them survive . . . produce completely stabilized steels that retain high-impact hardness and dimensional stability under toughest conditions.

Write us for Catalog and outline your needs for a no-obligation recommendation on a custom-designed unit.

Visit our Booth No. 2864, National Metal Exposition, Public Auditorium, Cleveland, O., October 27-31

CINCINNATI SUB-ZERO PRODUCTS

General Offices and Plant: 3930 S 8 READING ROAD, CINCINNATI 29, OHIO

Member, Environmental Equipment Institute

For more data circle 344 on Postpaid Card

Be cost-wise — STANDARDIZE on **BOSTON GEARS**



Includes
20° PRESSURE ANGLE
Spur, Bevel, and
Miter Gears in
441 STOCK SIZES
— SAVE 20%
in space, weight
and COST

2000 TYPES AND SIZES
FROM STOCK
FOR "OFF-THE-SHELF" DELIVERY
AT FACTORY PRICES

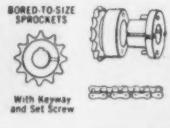
BOSTON GEARS take top-rating in any comparison for quality, precision, finish, and performance — and any gear you need is available from stock.

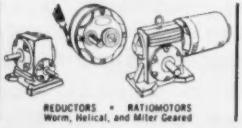
Ask for Catalog No. 56.

7124 PRODUCTS "OFF-THE-SHELF" - AT FACTORY PRICES

—STOCK GEARS — SPROCKETS & CHAIN — SPEED REDUCERS — BEARINGS—











— COUPLINGS — UNIVERSAL JOINTS — PILLOW BLOCKS —

CALL YOUR **BOSTON Gear** DISTRIBUTOR

For nearest Distributor look under "GEARS" in the Yellow Pages of your Telephone Book.

For more data circle 345 on Postpaid Card

SCHRILLO

ADJUSTABLE MICRO-STOP* COUNTERSINK

**Positive-Locking!*



Don't Take Our Word - YOU BE THE JUDGE!

Never will you find so much value at so low a price! Highest quality steel and superb workmanship. Precisely engineered to provide instant finger-tip adjustment to .001" without the use of wrenches or tools. Self-lubricating oversize bearings. Ball-thrust friction-resistant operation guarantees longer trouble-free wear.

The Positive-Locking Micro-Adjustment assures controlled accuracy to a tolerance of ±.001" — to prevent costly production losses by over or under cutting. Glass-smooth shield will not scratch or mar work piece. May also be used interchangeably for precision trepanning or removing collars from Hi-shear rivets.

TWO SIZES: 4" for cutters up to 5/8" dia; 5½" takes cutters to 1½" dia. *For complete information about superb Schrillo Tools — write or phone for the all-new catalog No.* 104-C.

SCHRILLO
AERO TOOL ENGINEERING COMPANY
8715 MELROSE AVE., LOS ANGELES 46, CALIF.

For more data circle 346 on Postpaid Card



OLIVER TEMPLATE TOOL BIT GRINDER

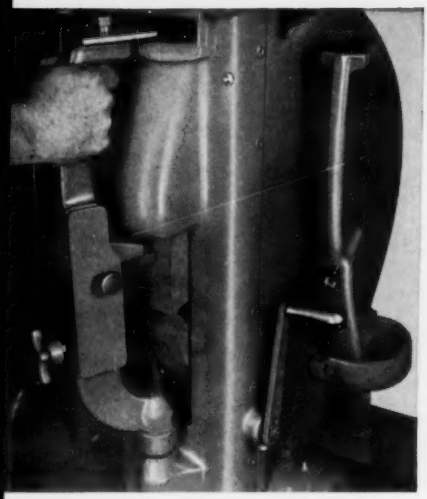
Precision Duplication

in ONE *operation*

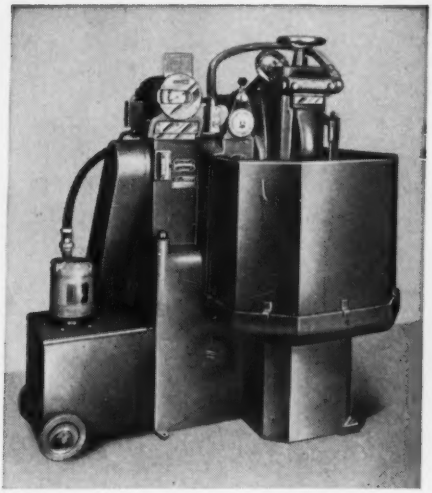
That's right! The Oliver Template Tool Bit Grinder sharpens single point tungsten carbide, high speed and stellite turning tools . . . duplicating exactly all original flats and radii every time the tool is ground . . . in one simple, efficient grinding operation.

How is it done? Well, as you can see from the drawing above the answer lies in "template control." The template at the top of the specially designed tool holder is a twice size replica of the tool being ground. The tool, securely held at mid-point in the holder, contacts the wheel and is ground until the template touches the template stop. In this manner, the tool is ground to the *exact* profile of the template. The entire operation is performed in seconds, easily, accurately on one machine . . . a machine that pays for itself by reducing your tool inventory and eliminating lost production time and tool breakage.

For more data circle 347 on Postpaid Card



The Oliver Template Tool Bit Grinder has a 20" wheel that grinds turning tools up to 1½" wide by 1¾" high, from 0° to 20° clearance . . . and to *any* predetermined contour or angle. The unit is self-contained in that it performs the complete grinding operation as well as template production. All working surfaces are hardened and ground steel and surfaced with tungsten-carbide where necessary to assure long life. A unique feature of the unit is the tool holder which permits an even, easily controlled tool pressure against the wheel. It's an iron frame—supported at its lower end by a ball and socket joint with a template at the upper end giving the operator a 2 to 1 leverage.



Outstanding among the Oliver Tool Bit Grinders' many advantages is ease of operation. Positive "template control" assures duplication of the tool shape in relation to the shank making all tools of a kind exactly alike. A clearance setting gauge determines the correct amount of metal to be removed. A plentiful supply of water, both through the wheel and on the tool, insures against overheating. The Oliver 20" Template Grinder will remove metal . . . both high speed and tungsten-carbide . . . at a speed unmatched by any other single point tool bit grinder currently on the market.

More **OLIVER** of **ADRIAN** *Tool Grinding Equipment*



ACE TOOL and CUTTER GRINDER

Universal—grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.



DIE MAKING MACHINE

Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 2 types.



FACE MILL GRINDER

Completely automatic. A machine tool designed for accurate grinding. Wheel dressed with every stroke.



No. 510 DRILL POINTER

Semi-automatic. For drills ¼" to 3" in diameter. No. 21 bench models available for size ½" and smaller.



DRILL POINT THINNER

For low cost reclaiming of drills. Corrects off-center and too-thick webs and out-of-index cutting edges.

t check the coupon for literature on the OLIVER of IRIAN machine you are interested in. Send it today to...

OLIVER of ADRIAN

LIVER INSTRUMENT COMPANY

130 E. Maumee St. • Adrian, Michigan

- ☐ Drill Pointer
- ☐ Face Mill Grinder
- ☐ "Ace" Universal Tool and Cutter Grinder
- ☐ Literature only
- ☐ Die Making Machine
- ☐ Drill Point Thinner
- ☐ Template Tool Bit Grinder
- ☐ Quotation requested

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

STANDARD BROACHES
all from stock!



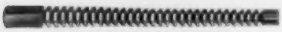
Minute Man
KEYWAY BROACH KIT

In one minute and for as little as one cent you can cut a keyway with this kit. For keyways from 1/16" to 1" in any bore from 1/4" to 3".

Minute Man



SQUARE BROACHES



HEXAGON BROACHES



New ROUND BROACHES

1/8" to 3/4" squares and hex's; 1/4" to 1" round. Production Type Keyway Broaches also in stock.

The duMONT CORPORATION
Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name .....

Company .....

Address .....

For more data circle 349 on Postpaid Card

Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

OCTOBER 8-10 • Gray Iron Founders Society Inc., Annual Meeting, Sheraton Park Hotel, Washington, D. C. Society headquarters: 930 National City-E. 6th Bldg., Cleveland 14, Ohio.

OCTOBER 13-15 • National Electronics Conference Inc., Annual Meeting and Exhibit, Sherman Hotel, Chicago. Conference headquarters: 84 E. Randolph St., Chicago 1, Illinois.

OCTOBER 13-16 • Wire Association, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Association headquarters: 453 Main St., Stamford, Connecticut.

OCTOBER 14-16 • Society of Industrial Packaging and Materials Handling Engineers, Annual Meeting and Industrial Packaging and Handling Exposition, Chicago Coliseum, Congress and Morrison Hotels, Chicago, Ill. Information: Hanson and Shea Inc., 1 Gateway Center, Pittsburgh 22, Pennsylvania.

OCTOBER 15-17 • American Machine Tool Distributors Association, Annual Meeting, Sheraton Plaza Hotel, Boston. Association headquarters: 1900 Arch St., Philadelphia 3, Pennsylvania.

OCTOBER 16-18 • Foundry Equipment Manufacturers Association Inc., Annual Meeting, Greenbrier, White Sulphur Springs, W. Va. Association headquarters: 1 Thomas Circle, Washington 5, D. C.

OCTOBER 26-29 • American Gear Manufacturers Association, Semi-Annual Meeting, Edgewater Beach Hotel, Chicago. Association headquarters: 1 Thomas Circle, Washington 5, D. C.

OCTOBER 27-31 • American Society for Metals, National Metal Congress and Exposition, Statler Hotel and Public Auditorium, Cleveland. Society headquarters: 7301 Euclid Ave., Cleveland 3, Ohio.

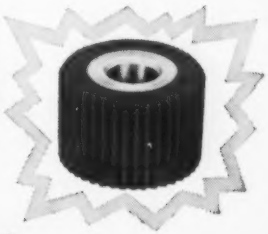
OCTOBER 29-31 • Metal Treating Institute, Annual Meeting, Hotel Cleveland, Cleveland. Institute headquarters: 271 North Ave., New Rochelle, N. Y.



OF COURSE . . . IT'S *American!*

.....Now AVAILABLE the New!

American REDSKIN



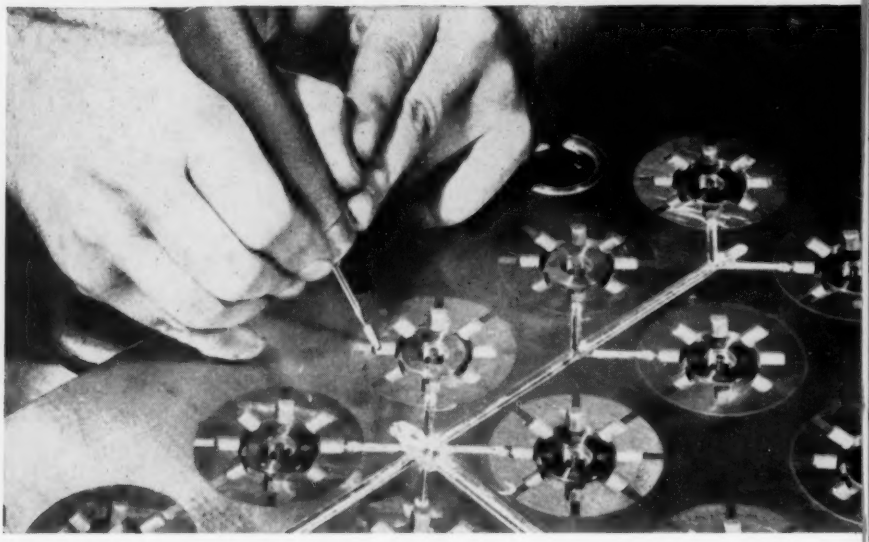
Patented Drill Bushing for Plastic Tooling

SEND FOR LITERATURE

AMERICAN DRILL BUSHING CO., 5107 PACIFIC BLVD., LOS ANGELES 58, CALIFORNIA

For more data circle 350 on Postpaid Card

32 ALUNDUM Abrasive for your tool and die jobs*



Here's how Norton keeps

"Making better products . . . to make your products better"

Norton mounted wheels are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing, assuring best possible results in:

TOOL AND DIE GRINDING

Norton mounted wheels with sharp 32 ALUNDUM abrasive and VBE bond are the very best performers.

Advantages: Wheels need no costly dressing; hold form; give constant cutting action — right down to the mandrel.

ROUGH GRINDING

For steel castings and weldments, mounted wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are unequalled.

For snagging cast iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

Advantages: Norton wheels give you the fastest cutting rate, with a marked increase of stock removed per wheel.

32 or 44 ALUNDUM Abrasive for your rough grinding



METAL-MOUNTING — Another Norton Exclusive — You throw nothing away but the mandrel!



Norton mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* This radically improved method of locking the abrasive body to the mandrel is used on most mounted wheels of 5/16" diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

Every Norton mounted wheel is accurately trued *after mounting* on rust-proof stainless steel mandrels. Developed to increase the time-and-money-saving "Touch of Gold," Norton mounted wheels are stocked in approximately 200 standard shapes and sizes. See your Norton Distributor for prompt deliveries.

Or write to NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

W-1880

NORTON
ABRASIVES

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

For more data circle 352 on Postpaid Card

PARKER · MAJESTIC PM PRECISION MACHINES

PARKER SPINDLES

FOR ANY MACHINE—FOR ALL APPLICATIONS

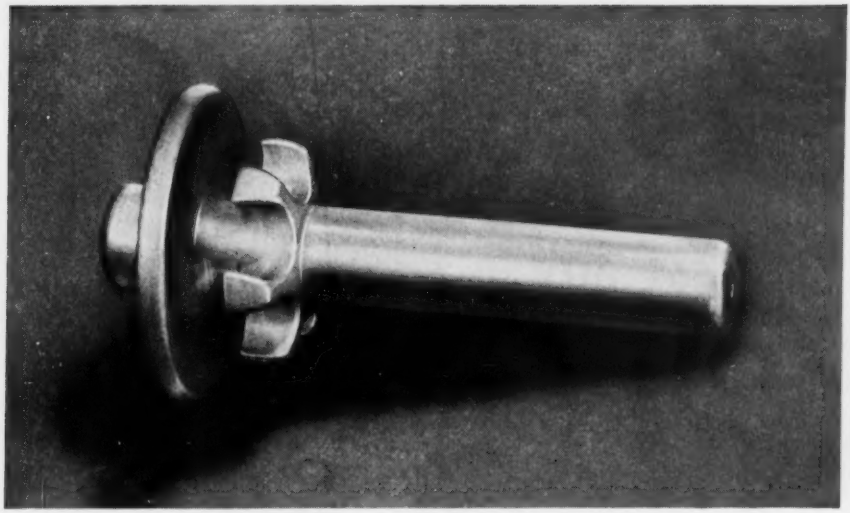


Following its development in 1915 and as a result of constant improvement through the years, the Parker Spindle has become one of the most widely used spindles in this country today on many makes of machines. The demand for speed and endurance in grinding, precision boring and milling which the Parker Spindle makes possible has made Parker-Majestic Incorporated the leading manufacturer of precision spindles.

PARKER-MAJESTIC, INC.

147 Joseph Campau • Detroit 7, Michigan

For more data circle 353 on Postpaid Card



HOW TO BOOST PRODUCTION
On Your Automatics

With Type 303 Stainless Steel, an automatic turns out this intricate part (10 operations) at the rate of five a minute . . . one every twelve seconds. Despite such production speeds, surface finish is held to 20 microinches and tolerances to .002″ t.i.r. Free-machining stainless steels make speeds like this commonplace, reducing unit costs and increasing profits.

Whether you are working with chromium-nickel, ferritic chromium, or martensitic chromium types, there's an Armco free-machining grade to help you boost production. All are available in a wide range of shapes and sizes in both bar and wire.

Quick Delivery

You can get the grade you need from your nearby distributor of Armco Stainless Steels. Standard grades can usually be delivered immediately from stock. Unusual requirements are quickly filled from the mill without delay.

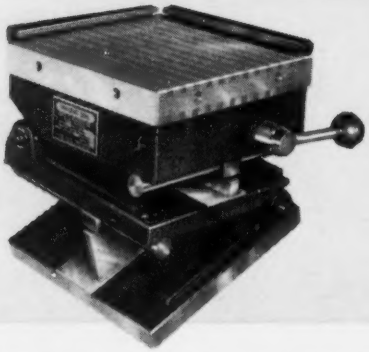
If you don't know the Armco Distributor nearest you, just write us at the address below. We'll help you get in touch with him. Armco Steel Corporation, 2788 Curtis Street, Middletown, Ohio.

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

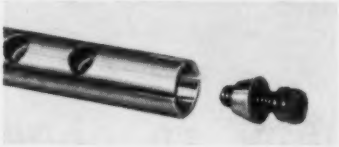
For more data circle 354 on Postpaid Card

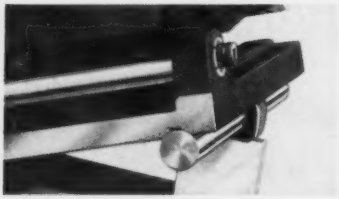
WHY *Robbins* IS YOUR BEST BUY



Only Robbins angular tooling equipment assures you positive accuracy when setting up to machine, grind or inspect angular work . . . because only Robbins gives you these exclusive features:

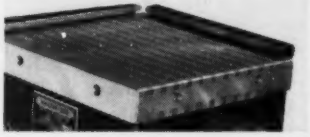
POSITIVE LOCKING locks firmly inside sine bar roll with expanding action for positive lock. Screw at each end locks toward front of unit, always pulls upper member firmly down on gage block without distortion. (Pat. app. for)





"PERMA-FLAT" SWIVEL BLOCK contacts gage block over entire face of swivel block instead of on a single thin line of contact. This patented feature provides greater contact between gage block and unit . . . combines with Robbins positive locking to assure the utmost accuracy.

FINE POLE ceramic magnet chuck, manufactured for Robbins by famed O.S. Walker Company, Inc. Strongest magnetic chuck available. Fine poles make it easier to set up smaller work, go right to the edge for easier setup next to rails.





IN ADDITION, both magnetic and non-magnetic models are built with ribbed base, intermediate and top plates for distortion-free strength and rigidity, with full-length ground roll seats for precision location, greater accuracy. All models make it possible to set up any angular work in just four simple steps . . . in minutes instead of hours! Before you purchase any sine plate, be sure you check Robbins' exclusive features. Write for new catalog!

OMER E. *Robbins* COMPANY
11961 DIXIE AVENUE DEPT. B DETROIT 39, MICH.

For more data circle 355 on Postpaid Card

For more data on advertisement on opposite page, circle 356 on Postpaid Card →



EVERY BARNES BLADE IS BUILT FOR EXTRA LONG LIFE AND ACCURATE CUTTING

From one metal cutting job to another, you'll find that a properly selected Barnes Blade will consistently give you longer service life and a greater degree of cutting accuracy. The uniform, high quality that's built into every Barnes Blade is proved by its top performance at a lower ultimate cost.

Call your Barnes Distributor today! He maintains a complete stock of Barnes Hack and Band Saw Blades to boost your production and lower costs. He also offers the services of a skilled Barnes Sales Engineer to quickly analyze your metal cutting requirements and provide peak production efficiency.

BARNES

W. O. BARNES CO., INC.

SUBSIDIARY OF NICHOLSON FILE COMPANY

1297 TERMINAL AVENUE • DETROIT 14, MICHIGAN

Specify **RING PUNCHES AND DIES**

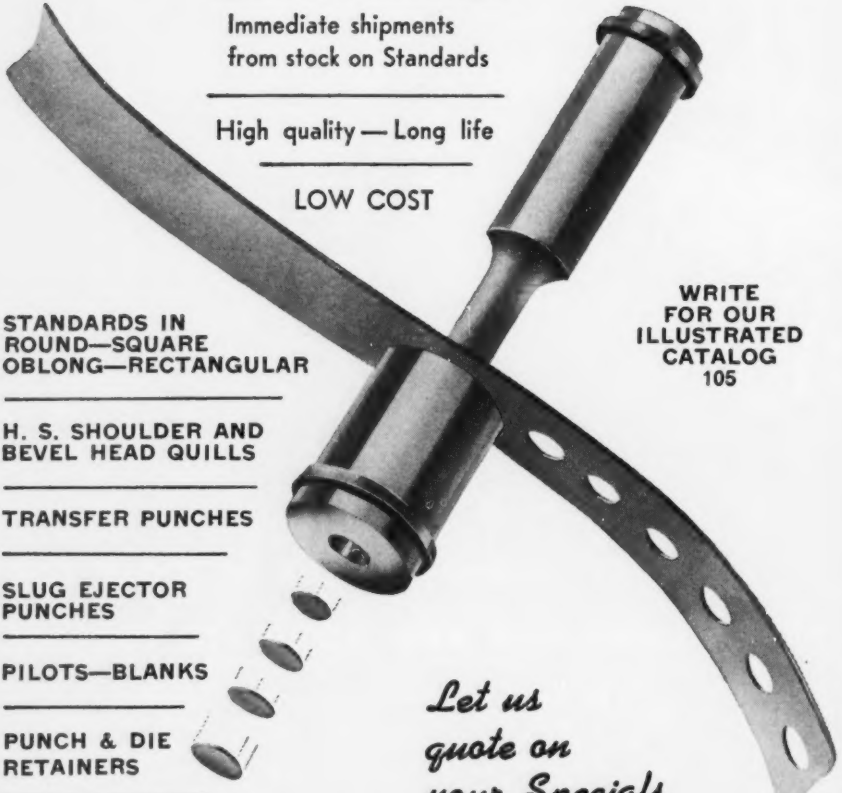
for your perforating problems

Complete interchangeability

Immediate shipments from stock on Standards

High quality — Long life

LOW COST



STANDARDS IN ROUND—SQUARE OBLONG—RECTANGULAR

H. S. SHOULDER AND BEVEL HEAD QUILLS

TRANSFER PUNCHES

SLUG EJECTOR PUNCHES

PILOTS—BLANKS

PUNCH & DIE RETAINERS

CHOICE OF STEELS

WRITE FOR OUR ILLUSTRATED CATALOG 105

Let us quote on your Specials

Send prints or sketches for prompt reply.

RING PUNCH & DIE, INC.

FENTON PLACE JAMESTOWN, NEW YORK

For more data circle 357 on Postpaid Card

15% more torque from the same air pressure while consuming 30% less air! *It's the new*

SIOUX

Air impact wrench!



"Free as the air" is an expression which has little application to compressed air. Learn more about the truly remarkable efficiency of the new SIOUX Air Impact Wrench.

Unexcelled Performance and Durability....

It's the SIOUX

Electric impact wrench



When it comes to electric impact wrenches, here is the maximum in dependable power per dollar. Available in ⅜" or ½" drive.



PELICAN

Spin nuts on or off without touching them . . . it's the *new* SIOUX

'Pelican' NUT ACCUMULATOR



PELICAN IN USE WITH NEW SIOUX AIR IMPACT WRENCH

LOADED CENTER STEM

Action of the impact wrench removes nuts and spins them up into the Pelican on a center stem. The stem will hold ten ¾" or 13/16" hex nuts, either 7/16" or ½" thread. Reverse action spins the nuts back on. Stems can be removed with their load of nuts and empty stems installed in their place. Or, stems can be pre-loaded and placed in Pelican for assembly operations.

The Pelican may be used with any ½" or ⅝" square drive, air or electric impact wrench.

LOOK UNDER "TOOLS—ELECTRIC"

WRITE FOR THE NEW CATALOG

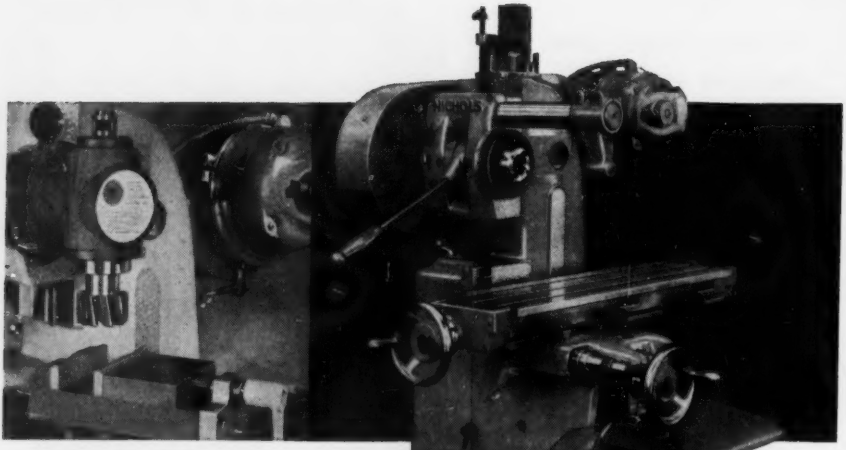
SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

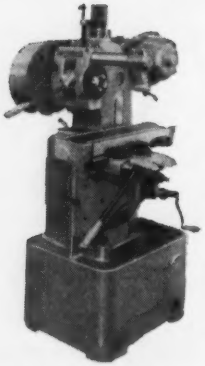
NEW AIR IMPACT WRENCHES • NEW AIR SCREWDRIVERS • NEW "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • SCREWDRIVERS • PORTABLE SAWS • VALVE FACE GRINDING MACHINES • FLEXIBLE SHAFTS • ABRASIVE DISCS

For more data circle 358 on Postpaid Card



STURDY NICHOLS VERTICAL HEAD . . . has No. 40 Taper Spindle **NICHOLS SWIVEL VISE** is a true precision unit equipped with verniers . . . only two of many available accessories.

NICHOLS TOOL ROOM MILLER



STANDARD MODEL—A precise, versatile Hand Miller with Rise and Fall spindle. Table size 6¾" x 21".

ACCURACY—SENSITIVITY—VERSATILITY

Gives the tool room what it demands—a compact, rugged miller with extreme accuracy and utmost flexibility. The Nichols TOOL ROOM MILLER is arranged for sensitive hand screw feed, has generous table surface—8½" x 30" with 19" longitudinal travel. Precision feed screws have oversize, *easy reading* micrometer dials. Large hand wheels provide element of "feel" so important in precision milling. Rise-and-Fall Spindle simplifies set-ups. Lever table feed, furnished *in addition to* screw feed, increases usefulness. Selective speed ranges up to 5000 RPM.

2 educational 16 mm sound color films available for free showing—send for descriptive letter and reservation form.

MANUFACTURED BY W. H. NICHOLS COMPANY

NATIONAL DISTRIBUTORS

THE ROBERT E. MORRIS COMPANY

REM SALES DIVISION

5004 FARMINGTON AVENUE • WEST HARTFORD 7, CONN.

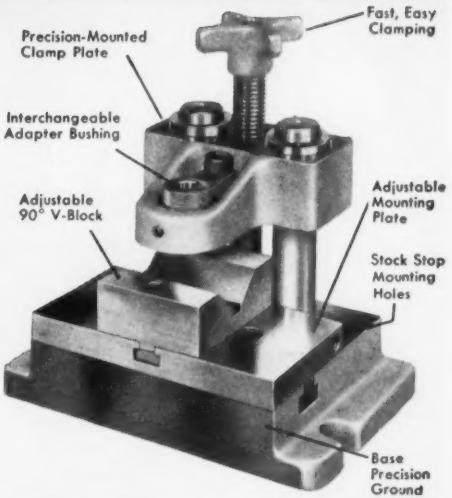
For more data circle 359 on Postpaid Card

REPCO Time-Saving Tools

ADJUSTABLE V-BLOCK DRILL JIG

Saves Set-Up Time— Increases Output

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to 5/16" diameter. Handles stock from 1/4" to 2" diameter.

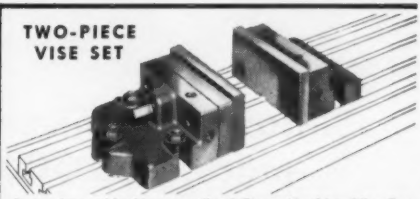


TRUE-CENTER ADJUSTABLE TOOL HOLDER



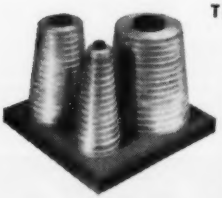
The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as 1/32" machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET



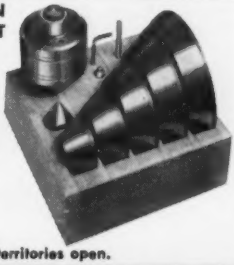
Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

CHUCK JAW TRUING-RING SET



This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by 1/16" increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET



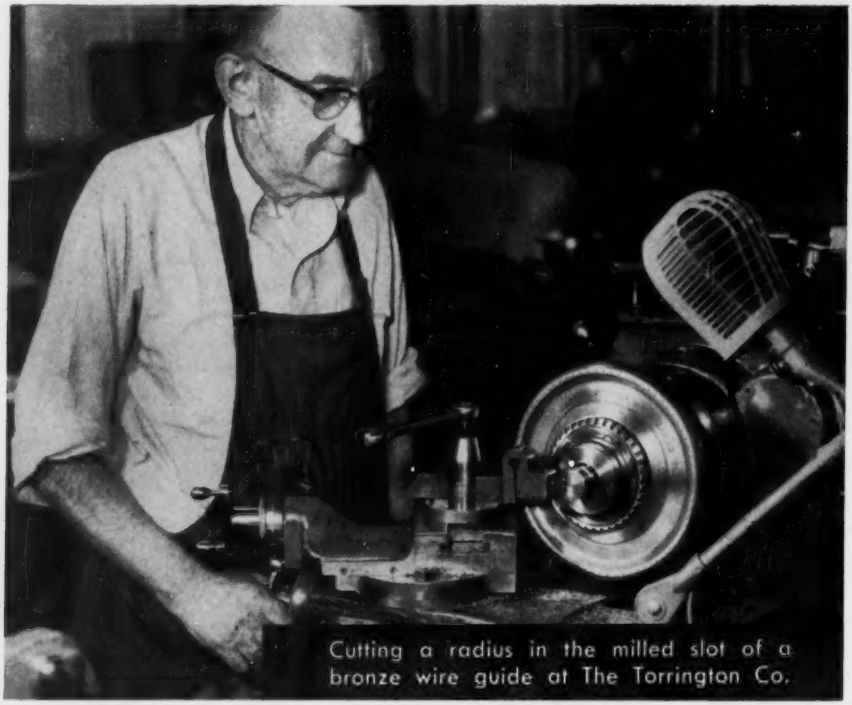
Heavy-duty live center plus six interchangeable adapters, ranging from a point to 6 1/4" dia. bell. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.

Write for complete information—Exclusive agent territories open.

REPCO ROCKFORD ENGINEERED PRODUCTS CO.

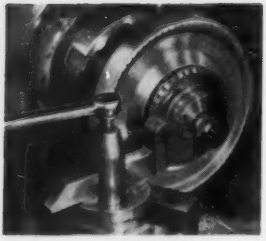
23rd Ave. & 20th St., Rockford, Illinois

For more data circle 360 on Postpaid Card



Cutting a radius in the milled slot of a bronze wire guide at The Torrington Co.

"I have never used a finer chuck in more than 50 years on the job"



Turning radius in slot of bronze wire guide.

Mr. James Bagrie, holds work and tools with O.D. from 1/16" to 1½" in an 18 speed 12" Hendey Lathe equipped with a Jacobs Model 91 Rubber-Flex Collet Chuck. Mr. Bagrie likes the easy-to-use versatility of the Model 91. He says:

"It's a splendid chuck in all ways. It has a good, positive grip and the hand wheel makes it a real timesaver. I've never used a finer chuck in more than 50 years on the job."

You hold your work with the tightest, most accurate grip ever devised when you hold with the Jacobs Rubber-Flex Collet. Ask your industrial supply distributor for Bulletin 57-LC on the Model 91 Hand Wheel Collet Chuck.

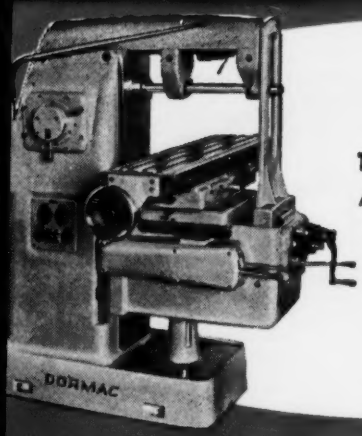
Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

Jacobs CHUCKS

The Jacobs Manufacturing Company, West Hartford, Connecticut

For more data circle 361 on Postpaid Card

For more data on advertisement on opposite page, circle 362 on Postpaid Card ——→



DORMAC • MILL-MATIC

DIAL TYPE • HIGH SPEED

1200 rpm Universal Milling Machines

ACCURATE • DURABLE • EASY TO OPERATE

National standard taper Power feed in all directions. Hardened and ground gears. Power rapid traverse.

MILL-MATIC 48" x 11" Table ....$4390.

DORMAC 60" x 12" Table .....$5350.

Standard equipment included.

WOTAN

HIGH PRECISION

3⅜" BORING MILL

for Toolroom and Production

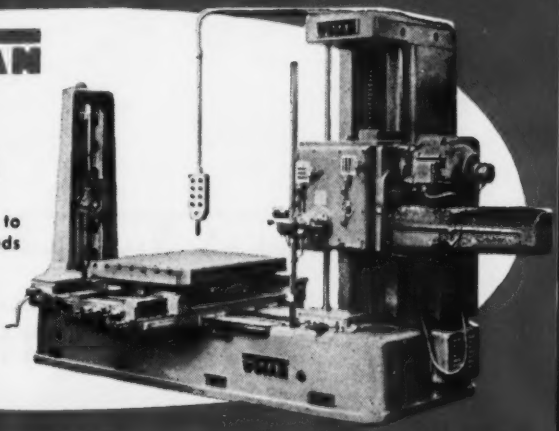
CAPACITY:

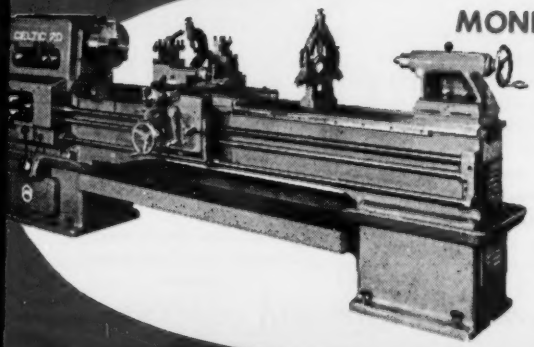
Vertical Capacity 36", Distance Spindle to Outboard Support 86", M.T. #5, Speeds up to 1000 RPM.

OTHER SIZES ARE BUILT IN:

4⅜" and 5⅛"

Table & Floor Type Models





MONDIALE CELTIC

PRECISION LATHES

CELTIC 20" LATHE

MADE IN 12"-14"-17"-20" SWINGS

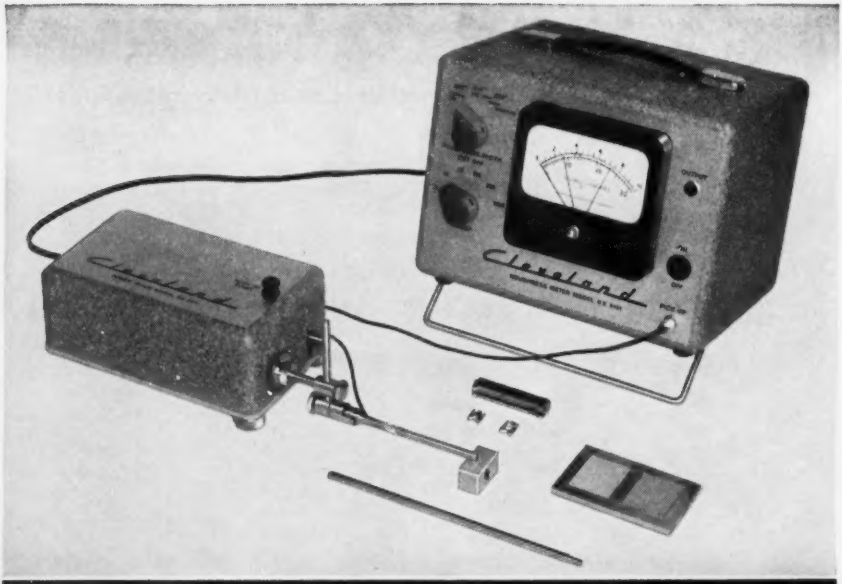
QUALITY • PRECISION

DEPENDABILITY

DEALER INQUIRIES INVITED WRITE FOR ILLUSTRATED BROCHURE

INDEX INDUSTRIAL CORPORATION

MM 150 BROADWAY • NEW YORK 38, N. Y. • BEekman 3-4540



MUCH MORE - for LESS!

with *Cleveland* ROUGHNESS METER

The Roughness Meter was designed to do more than any other surface measurement instrument at a price within the range of any budget.

More VERSATILE—with less equipment you can measure the widest range of surface shapes—outside diameters down to .030"—inside diameters as low as .25".

More ACCURATE—less arguments. Precision calibration and construction exceeds all military and industrial standards.

More VALUE—lower cost. You will save from 35% to 100% over the cost of comparable equipment.

More CONVENIENCE—less confusion. The easiest to operate. Clearly marked controls, skids, adjustable tolerance hands.

other CLEVELAND PRECISION INSTRUMENTS

INDI-AC—Ultra-Precision Electronic Height Gage

•

MICRO-AC—Electronic Micro-Comparator

•

PAR-AC—Electronic Production Gage

•

INDI-RON—Ultra-Precision Roundness, Squareness and Concentricity Gage

•

INDI-AC Jr.—General purpose precision gage. Battery and AC operated.

•

AU-MAC—Automatic Machine Control and Positioning Systems

Cleveland **INSTRUMENT COMPANY**

735 Carnegie Avenue • Cleveland 15, Ohio

For more data circle 363 on Postpaid Card

BREAK THE "PROFIT SQUEEZE" WITH BRIGHTBOY

Improve Your Product at Lower Cost

The unique working action of multi-use Brightboy (*abrasive and rubber, functioning simultaneously*) produces a finish that frequently constitutes the final polish.

Brightboy is a STOCK line, made in a wide range of Silicon Carbide and Aluminum Oxide grains. Each in grades from extra fine to extra coarse, in soft, firm and tough rubber binders. The compound is in the rubber. *No muss! No fuss!*

Brightboy numbers are JOB-MATCHED to your finishing requirements; often take the place of "special" compounds; prove their versatility on regular and special finishing. A Brightboy finish frequently constitutes the final polish, without necessitating an extra operation.

Made in WHEELS, STICKS, RODS & BLOCKS for machine and manual applications. Ask your dealer to recommend the Brightboy numbers for your needs, and for the Brightboy catalog listing applications and machine speeds. Write for "Notes From The Brightboy Service Engineer," describing Brightboy applications and uses.

Write for FREE SAMPLE
BRIGHTBOY HAND PIECE
for quick-job cleaning.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

For more data circle 364 on Postpaid Card

LW

America's Largest Builders of

DIVIDING HEADS

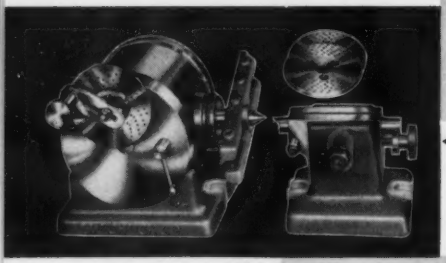
Accurate, Heavy Duty

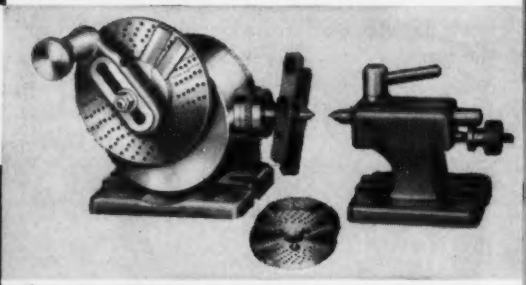
Ball bearing thrust on worm shaft and rear end of spindle. Headstock spindle has threaded nose. Large tapered bearing adjustable for end play. Head tilts past 90°. Worm wheel and alloy stress-proof steel worm cut to close limits for accuracy. Complete with three index plates for dividing all numbers to 50 and even numbers to 100 except 96T. Index chart shows all divisions obtainable to 380. Specify left (illustrated) or right hand model.

MODEL SD

6½" Swing. Spindle threaded 1½"-8. 9/16" table slot tongues. 36 lbs.

$175.00





MODEL BP

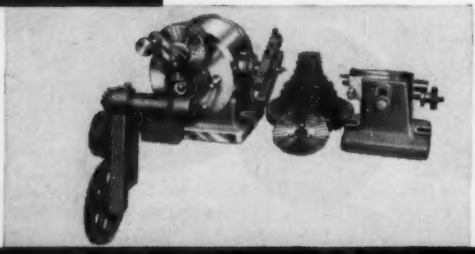
11" Swing for plain milling machine. Spindle threaded 2¼"-10. ⅝" table slot tongues. 140 lbs.

$295.00

MODEL AU

11" Swing. Fully universal for complete indexing and spiral cutting. Spindle threaded 2¼"-10. ⅝" table slot tongues. 190 lbs.

$460.00



* See your dealer or order direct, giving dealer's name.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



L-W CHUCK COMPANY

28 South St. Clair Street
Toledo 4, Ohio



Ten weeks protection against DERMATITIS

The above 10 oz. tube contains enough cream to protect the hands of a valued employee for ten weeks. West Antiseptic Protective Creams are formulated in accordance with the accepted recommendations of leading authorities in the field of Industrial Dermatitis. They are used as easily as ordinary hand creams. The result: comfortable, invisible protection that keeps industrial irritants from prolonged contact with the skin.

West Antiseptic Protective Creams are normally used four times a shift. They are part of a program that overlooks no contributing source of dermatitis — the highly successful West Program of Dermatitis Prevention and Control.

How does it work?

Lanokleen, antiseptic soaps and other specially formulated hand cleaners insure safe, effective cleansing. Germicidal specialties protect against bacterial infections. "Vinylite" aprons and armguards prevent clothing contamination. And, of course, Antiseptic Protective Creams help protect exposed skin areas.

The West Program of Dermatitis Prevention and Control is an inexpensive way to protect workers and management against the needless penalties of dermatitis. Interested? Just send the coupon. Or call your local West office.

Programs and Specialties for Preventive Maintenance and Protective Sanitation.

WEST DISINFECTING Company

WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC.
42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities
In Canada: 5621-23 Casgrain Ave., Montreal



☐ Please send your 24 page booklet, "The Control of Dermatitis in Industry."

☐ Please have a West Representative telephone for an appointment.

Name_____

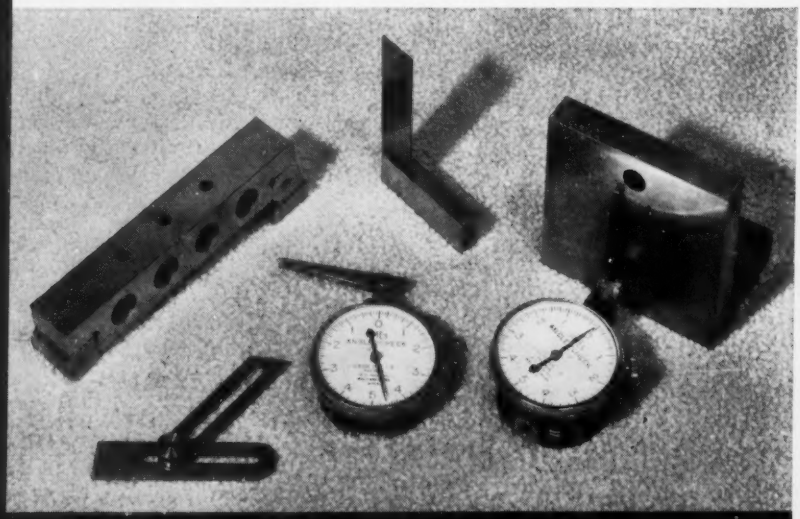
Position_____

Mail this coupon with your letterhead to Dept. 16.

For more data circle 366 on Postpaid Card

For more data on advertisement on opposite page, ← circle 365 on Postpaid Card

Check Angles Quickly and Precisely with the New



AMES DIAL TYPE ANGLE CHECK®

ANGLE CHECK, a new dial type measuring instrument, offers you a fast, low cost, extremely accurate method for checking angular parts.

There are two ANGLE CHECKS: Model V for vertical work; Model H for horizontal. Either model takes AMES 200 Series backs. Contact blades are available in various shapes and lengths.

Ruggedly built, ANGLE CHECK saves hours in checking angles on simple and intricate shapes.

The contact blade can be set to a predetermined angle with the dial "0" under the indicator hand. A range of 5°—plus or minus—in increments of 5′ can be obtained. ANGLE CHECK is accurate to 5′. Write today for complete information.

Representatives in Principal Cities



B.C. AMES CO.

29 Ames Street, Waltham 54, Mass.

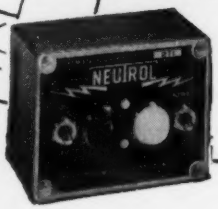
Canadian Office — B. C. Ames Co., 45 Oriole Parkway, Toronto

MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAUGES

For more data circle 367 on Postpaid Card

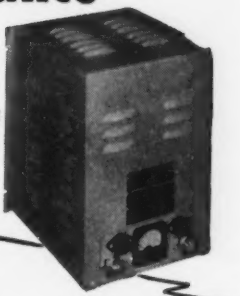
For more data on advertisement on opposite page, circle 368 on Postpaid Card ——→

electrical controls for Full Magnetic Chuck performance



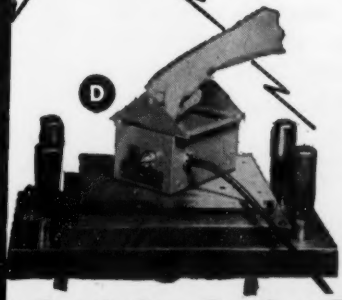
Ⓐ ELIMINATE STRONG ARM METHODS

Ⓑ DEPENDABLE SOURCE OF DIRECT CURRENT



Ⓒ PARALLEL GRINDING WITHOUT SHIMMING





Ⓓ

The Best Is None Too Good For Your Cutting Tools And Dies

Ⓐ ELECTRO-MAGNETIC CHUCK CONTROL

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production. Chuck capacities: 50 to 15,000 Watts . . . 60 to 20,000 square inch chuck area.

Ⓑ ELECTRO-MATIC RECTIFIER

Power conversion Unit, proved for dependable use with Magnetic chucks and other direct current equipment, from 50 Watts to 40 Kilowatts.

Ⓒ NEUTROLATOR HOLDING POWER REGULATOR AND CHUCK CONTROL

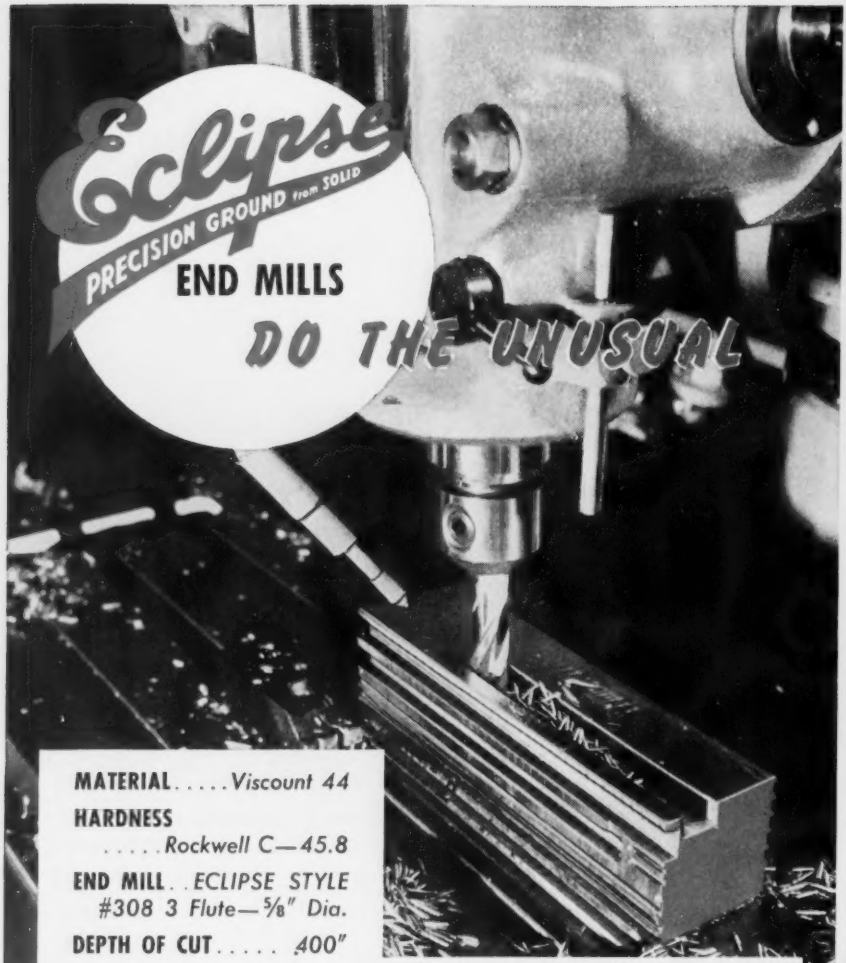
Provides regulation of holding power which permits grinding without shimming, to closer parallelism than ever before possible. In production grinding where holding power must be the same with each work piece, Neutrolator reproduces the same tension on successive pieces without readjustment. Where various tensions are required, a simple dial or push-button control provides regulation of holding power.

Ⓓ ELECTRO-MATIC A.C. DEMAGNETIZER

Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.

ELECTRO-MATIC PRODUCTS CO.

2231 N. Knox Ave. Chicago 39, Ill. (U.S.A.)
Telephone: BEImont 5-4010



MATERIAL.....*Viscount 44*

HARDNESS
.....*Rockwell C—45.8*

END MILL..*ECLIPSE STYLE #308 3 Flute—5/8" Dia.*

DEPTH OF CUT..... *.400"*

SPEED
22 S.F.M. (135 R.P.M.)

FEED.....*15/16 I.P.M.*

Thousands saw this remarkable performance at the "TOOLING FOR COMPETITION" A. S. T. E. SHOW in Philadelphia.

Write For Catalog E 58 M

ECLIPSE COUNTERBORE COMPANY

End Mill Division **Detroit 20, Michigan**

For more data circle 369 on Postpaid Card



ANOTHER CUSHMAN

AIR CHUCK

AT WORK!

Hold it right and machine it faster with:
CUSHMAN air operated chucks
rotating air cylinders
manually operated chucks
power wrench chucks and power wrenches
pinch jaw chucks—hand and automatically operated
boring mill and face plate jaws

CUSHMAN CHUCKS,
a product of American quality,
labor and materials.

Sold through
your industrial
distributor.

THE CUSHMAN CHUCK COMPANY

hartford 2, conn.

ANOTHER NEW
di-acro
PRODUCT



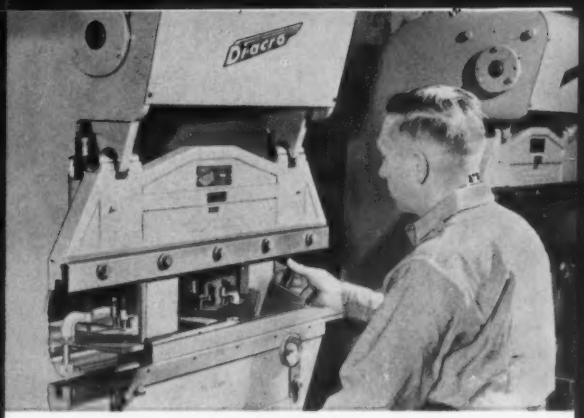
Di-Acro Hydra-Power Press Brake Model 16-72.
Ram adjusted, forms up to 6 ft. wide 16 gauge steel —62" between housings.

these duplicating operations and many others are performed on DI-ACRO HYDRA-POWER PRESS BRAKE

CURLING
BEADING
CORRUGATING
FLANGING
HEMMING
SEAMING
FLATTENING
PUNCHING
BLANKING
DRAWING
JOGGLING
CHANNEL FORMING
BOX FORMING



The Piper Aircraft Corporation of Lock Haven, Pennsylvania, has increased small part forming 50 per cent with two Model 16-36 press brakes. Heavy production machines are free from costly short runs.



The Edson Tool & Mfg. Co. of Belleville, New Jersey, has this Model 16-36 Press Brake. Management acclaims the low cost, low maintenance, and short set-up time . . . now has eight Di-Acro Brakes in operation.

Hydraulically Operated Press Brake

with dual speed operating cycle and adjustable stroke

★ Increases press brake output **★ Minimizes operator fatigue**

★ Eliminates hazards of high speed production

In less than 15 seconds the operator can pre-set the length of stroke on the new Model 16-72 Press Brake to the narrowest and safest opening for each job. The Dual Speed Operating Cycle provides a *high speed* ram approach and return on each operating cycle plus an automatic increase in power during the *slow speed* work part of each stroke when the material is formed. Material does not whip and the operator is not required to slip a clutch.

The twenty-five tons of ram pressure on the Model 16-72 Brake can also be inched delicately to a hair-wide scribed line with this new press brake where it can be stopped and started to carry through the operating cycle *with full pressure*. The ram is also instantly reversible at any point in the stroke.

This new design in press brakes has two rotary vane-type hydraulic cylinders that are mechanically linked to the ram to provide equalized pressure at all times. These cylinders oscillate through an arc of 270 degrees or less depending upon the length of the pre-set stroke. There are no brake bands or clutch discs to wear out or adjust.

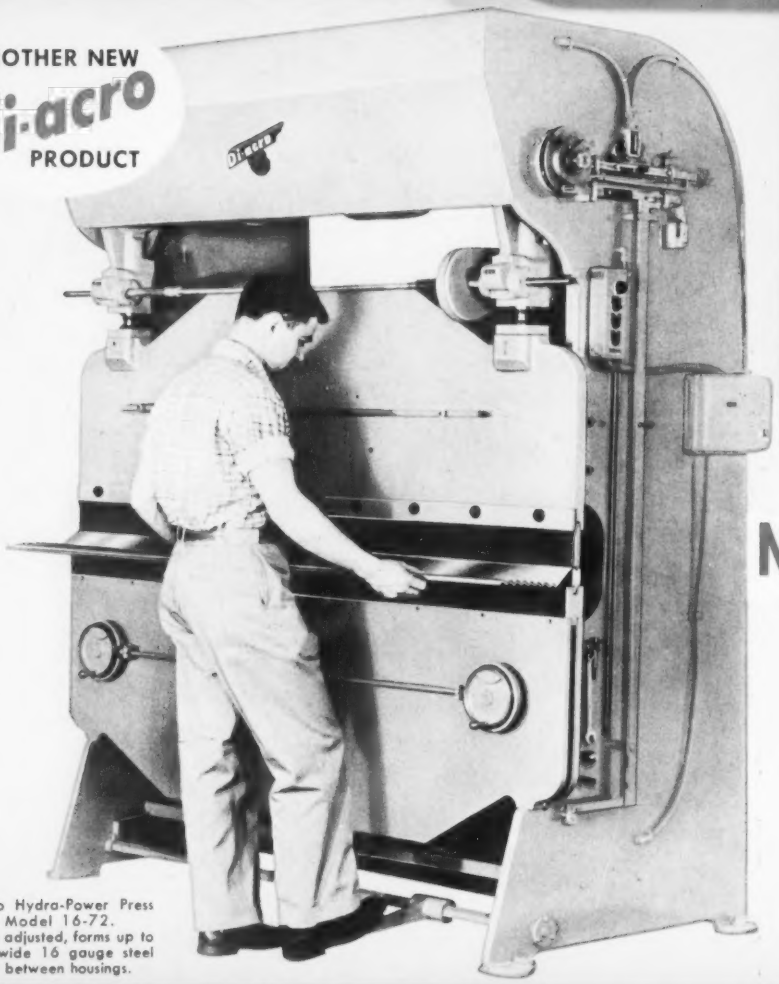
Safety features and foolproof automatic operation make these the ideal production machines for women and inexperienced operators. Included as standard equipment with the Model 16-72 Brake are such additional features as Power Ram Adjustment and Micrometer Front Operated Back Gauges. There are honestly so many advantages to this brake that it takes an eight-page folder to tell the whole story. Why not use the postage-free coupon below to request your copy today.

See Di-Acro Machines in operation at Booth No. 260, National Metal Exposition, October 27-31, Cleveland

ANOTHER NEW

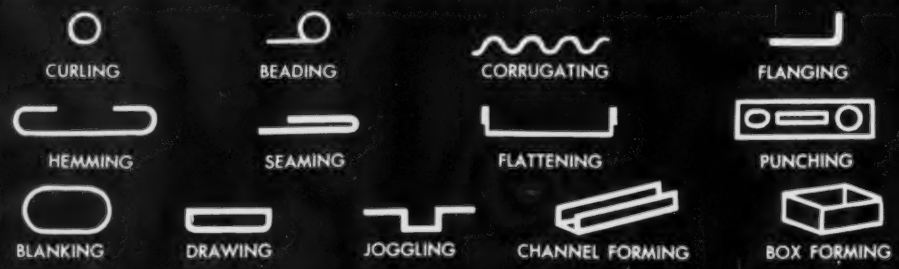
di-acro

PRODUCT



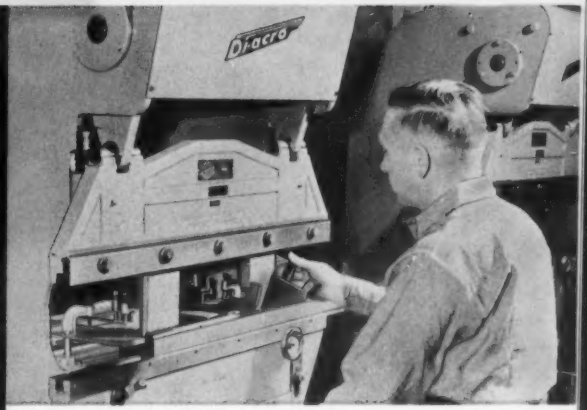
Di-Acro Hydra-Power Press Brake Model 16-72. Ram adjusted, forms up to 6 ft. wide 16 gauge steel —62" between housings.

these duplicating operations and many others are performed on DI-ACRO HYDRA-POWER PRESS BRAKE





The Piper Aircraft Corporation of Lock Haven, Pennsylvania, has increased small part forming 50 per cent with two Model 16-36 press brakes. Heavy production machines are free from costly short runs.



The Edson Tool & Mfg. Co. of Belleville, New Jersey, has this Model 16-36 Press Brake. Management acclaims the low cost, low maintenance, and short set-up time . . . now has eight Di-Acro Brakes in operation.

Hydraulically Operated Press Brake

with dual speed operating cycle and adjustable stroke

★ Increases press brake output ★ Minimizes operator fatigue

★ Eliminates hazards of high speed production

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 13, Lake City, Minn.

O'Neil-Irwin Mfg. Co.

306 8th Ave., Lake City, Minnesota

For the finishing touch that means so much!

From the smooth feel of perfectly polished stainless steel tableware to the contoured grips on modern power tools, Jewel Brand Coated Abrasives are bringing fast, efficient grinding, smoothing and polishing to the manufacture of hundreds of products. Because *end products cost less when you finish with Jewel Brand Abrasives*, it will pay you to bring their many advantages to bear on your finishing problems. Order now from your Industrial Distributor or write for specific recommendations.

NAME _____

ADDRESS _____

COMPANY _____

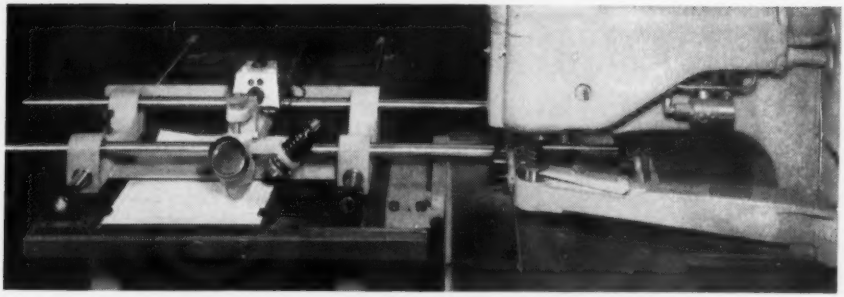
POSITION _____

Please send me detailed, illustrated specifications on the new hydraulically operated press brake, Model 16-72.

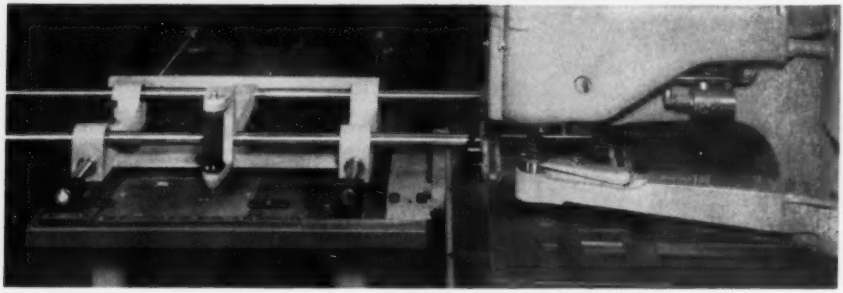
O'Neil-Irwin Mfg. Co.
306 8th Ave., Lake City, Minnesota

di-acro
PRECISION METALWORKING MACHINES

pronounced die-ack-ro



shortest distance between blueprint and product



The DUPL-O-SCOPE

Firms punching or notching sheets up to ¼" mild steel in medium runs know how profitable it is with a Strippit Fabricator-Duplicator. Now, it's even faster with the new Dupl-O-Scope, which eliminates the template drilling and layout step!

Readily mounted in the Duplicator stylus bracket, this precision optical pickup device quickly translates a drawing, layout or printed circuit sample into a punched metal template — ready for rapid-fire punching and notching on the Fabricator-Duplicator.

Write today for catalog and an actual demonstration by a Strippit Mobile Unit. Warehouse stocks at Chicago and Los Angeles.



The versatile Strippit Fabricator for quick-change punching, notching and nibbling — available with positive Duplicator.

WALES

STRIPPIT

Company

207 Buell Road, Akron, New York

In Canada: Strippit Tool & Machine Ltd., Brampton, Ontario

A UNIT OF HOUDAILLE INDUSTRIES, INC.

For more data circle 373 on Postpadi Card

For the finishing touch that means so much!

From the smooth feel of perfectly polished stainless steel tableware to the contoured grips on modern power tools, Jewel Brand Coated Abrasives are bringing fast, efficient grinding, smoothing and polishing to the manufacture of hundreds of products. Because *end products cost less when you finish with Jewel Brand Abrasives*, it will pay you to bring their many advantages to bear on your finishing problems. Order now from your Industrial Distributor or write for specific recommendations.



JEWEL BRAND

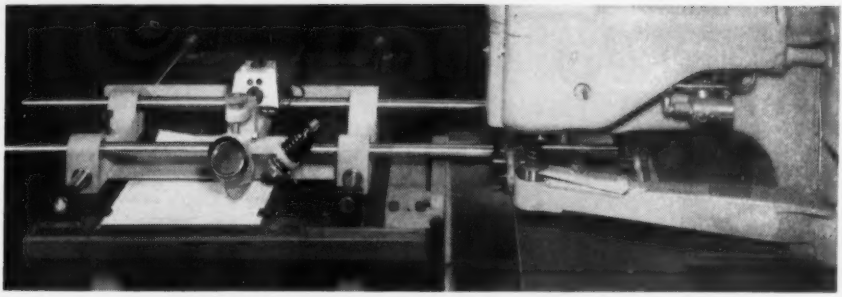
COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

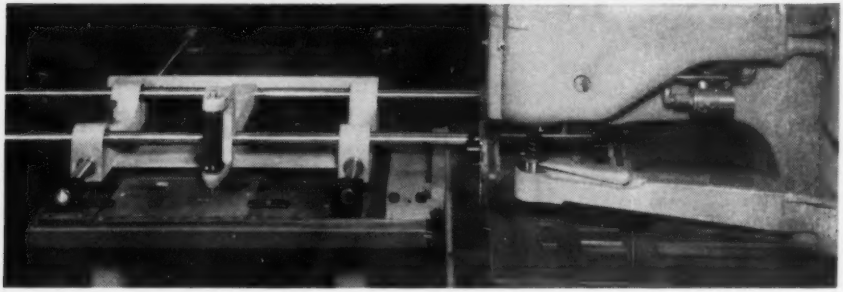
ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

For more data circle 372 on Postpaid Card



shortest distance between blueprint and product

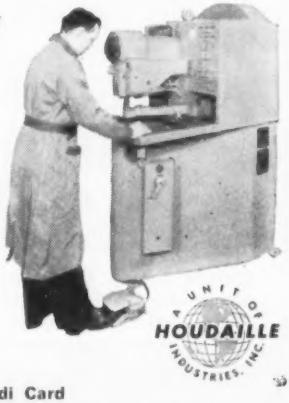


The DUPL-O-SCOPE

Firms punching or notching sheets up to ¼" mild steel in medium runs know how profitable it is with a Strippit Fabricator-Duplicator. Now, it's even faster with the new Dupl-O-Scope, which eliminates the template drilling and layout step!

Readily mounted in the Duplicator stylus bracket, this precision optical pickup device quickly translates a drawing, layout or printed circuit sample into a punched metal template — ready for rapid-fire punching and notching on the Fabricator-Duplicator.

Write today for catalog and an actual demonstration by a Strippit Mobile Unit. Warehouse stocks at Chicago and Los Angeles.



The versatile Strippit Fabricator for quick-change punching, notching and nibbling — available with positive Duplicator.

WALES

STRIPPIT

Company

207 Buell Road, Akron, New York

In Canada: Strippit Tool & Machine Ltd., Brampton, Ontario

For more data circle 373 on Postpadi Card

Men of Modern Machine Shop



JOSEPH KELLER, The Robert W. Walker Company . . . serving Northern California, Washington and Oregon.

★ ★ ★ ★



GEORGE E. HAY, District Manager . . . serving the Western Pennsylvania, Western New York, Ohio, Kentucky and Southern Indiana territory.

modern machine shop

ADVERTISING REPRESENTATIVES

John M. Krings, *Vice President,* Tribune Tower, Chicago 11, Illinois, DElaware 7-5441. Western Michigan, Illinois, Wisconsin, Iowa, Minnesota, the Dakotas, Northern Indiana.

George E. Hay, 431 Main St., Cincinnati 2, Ohio, CHerry 1-5924. Western Pennsylvania, Western New York, Ohio, Kentucky, Southern Indiana.

Jeryl L. Marlatt, 1051 Brooklawn Rd., Birmingham, Mich., MIdwest 6-5935. Eastern Michigan, Northwestern Ohio.

Norman S. Rogers, 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Central Indiana.

Gene J. Schwarber, *Advertising Manager,* 431 Main Street, Cincinnati 2, Ohio, CHerry 1-5924. Missouri, Kansas.

Duncan W. Barton, 342 Madison Ave., New York 17, N. Y., Murray Hill 7-7390. Eastern Pennsylvania, Central New York State, New Jersey, Maryland, Delaware, Washington, D. C., Long Island, Brooklyn.

Granville M. Fillmore, *Vice President,* 342 Madison Ave., New York 17, N. Y., Murray Hill 7-7390. Eastern New York State, Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, Maine.

The Robert W. Walker Company, 730 South Western Ave., Los Angeles 5, Calif., DUnkirk 7-4388, 57 Post St., San Francisco 4, Calif., SUtter 1-5568. California, Oregon, Washington.

★ ★ ★ ★

modern machine shop
431 Main St. Cincinnati 2, Ohio



DISCOVERED!

... new way to keep cutting fluids as fresh as a daisy!



SEE NEXT TWO PAGES



DISCOVERED . . . A NEW WAY TO KEEP COOLANTS FRESH AS A DAISY!

Shop tests show ELCIDE 75 keeps cutting fluids fresh longer than ever before

Now . . . there's a new and better way to control the harmful bacteria that cause oil-water emulsion breakdown, acidic corrosion, and rancid odor. It's Elcide 75 . . . a product directly related to one of the most powerful bacteria killers used in medical science today . . . a material that has proved itself in the exacting field of surgical practice and has now been adapted to solve the problem of bacterial growth in soluble oil emulsions.

A large Midwestern manufacturing plant tested Elcide 75 under job conditions.

They found that one ounce of Elcide 75 added to each 4 gallons of oil-water emulsion . . .

extended the useful life of the emulsion by 5½ times . . .

proportionately reduced down time for recharging . . .

was safe and nontoxic . . .

greatly reduced cutting oil requirements . . .

delayed odor and emulsion break for 22 weeks, while untreated machines had to be dumped at the end of four weeks . . .

eliminated bacterial slime and reduced acidic corrosion . . .

drastically cut disposal problems.

What Elcide 75 can do for you. This combination of inhibitors can extend the life of your oil-water emulsions 2 to 4 times, or more, and can dramatically cut your oil-concentrate purchases. At the same time, production will increase because you have less down time for recharging.

ELI LILLY AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION
INDIANAPOLIS 6, INDIANA TELEPHONE: MELROSE 6-2211
For more data circle 375 on Postpaid Card



This is one of the causes of emulsion trouble. These are *Pseudomonads*, one of the harmful bacteria in oil-water emulsions. These, and other bacteria, enter emulsions through the air, water, and plant debris. They set the stage for a chain reaction which causes odor, corrosion, and emulsion breakdown.

Prior to Elcide 75, no single inhibitor was able to control the full range of bacterial growth. Certain of these bacteria quickly develop resistance to single inhibitors and continue to flourish. Now, Elcide 75 controls a wider range of bacteria because it is an effective combination of proven bactericidal agents.

In certain areas where waste-oil disposal is a problem, the use of Elcide 75 proportionately reduces the size of the problem.

Elcide 75 also contributes to better products and longer machine-tool life. Bacterial contamination causes acidic decomposition of the emulsion and sets up conditions for corrosion. By controlling the bacteria, you eliminate this source of trouble.

Employees like Elcide 75 because, when added to the emulsion, it is completely safe. In another recent test involving over 1000 machines, it was shown that Elcide 75 was safe, nontoxic, and harmless to sensitive skin. It also reduces the chance for bacterial infection caused by contaminated emulsion.

You know what you get when you buy Elcide 75. With Elcide 75, you have the proper amount for effective treatment because you add it to your emulsions right in your plant. The standard recommendation is one ounce of Elcide 75 per 4 gallons of oil-water emulsion.

Prove it to yourself . . . try Elcide 75 in your plant. The best way to determine the value of Elcide 75 is to try it under your normal plant conditions, using your regular oil-water emulsion. After you've had an opportunity to compare results, we believe you'll agree that Elcide 75 is a valuable discovery that will greatly increase your plant efficiency.

PRODUCT SPECIFICATIONS
ELCIDE 75

(Lilly's brand of bactericide for cutting fluids)

Active ingredients—Thimerosal (Sodium Ethylmercuri Thiosalicylate) and Sodium o-phenylphenate.

Package	Price per Gal.
1-gallon polyethylene	$8.50
5-gallon polyethylene	$8.00
55-gallon stainless steel	$6.50

Terms: 1%, 10th prox.; net, 30th prox. F.O.B. Indianapolis. Transportation paid via carrier of our selection.

For information or to place your order, phone or write.

ELCIDE 75™

PATENT PENDING

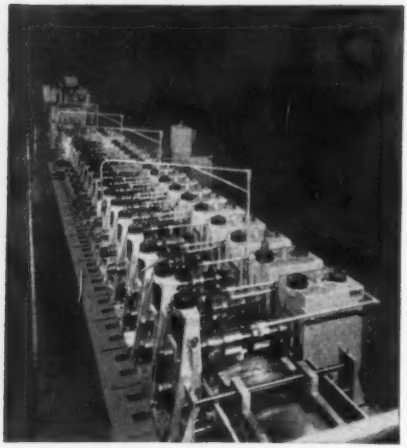
Lilly

Steel Roof Decks and Flooring cold rolled up to 200 f.p.m. on this mammoth



AMERICAN ROLLER DIE CORP.
ARDCOR

ROLL FORMING MACHINE



ARDCOR Roll Forming Machines feature: Unit Design — spindles in self-contained SEPARATE HOUSINGS, with speed reducers; Large Range of Vertical Centers; Double Bearing Design of Drive Housings; All Bearings are Anti-Friction; Micrometer Type Dials and Scales.

This entire automated production line is 15 ft. wide, 6 ft. high and 120 ft. long with total equipment weighing approximately 175 tons. Mill stands are completely movable, having 4½ in. dia. spindles with 42 in. roll space.

Fed by 20,000 lb. steel coils, the twenty-two roll passes from the 1½ in. deep by 2 ft. wide sections. The mill operator controls the loading, lining-up and feeding of the coil stock from a control bridge at entry of the mill. A 150 ton Straight Sided ARDCOR Press cuts off sections to proper lengths.

ARDCOR Roll Forming Machines are available in six standard sizes, other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and construction to produce them better . . . at greater speeds and profit!

Consult our Engineering Facilities, without obligation . . .

American **ROLLER DIE CORP.**

29590 Clayton Avenue **Wickliffe, Ohio**

ARDCOR *Engineered* MEANS BETTER COLD ROLL FORMING

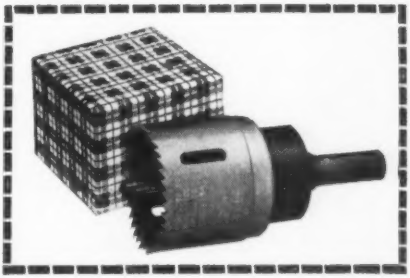
DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

For more data circle 377 on Postpaid Card



shatterproof LENOX HOLE SAWS

Even when the going is *extra rugged* — the LENOX HOLE SAW performs with precision and dependable safety. The specially-designed, extra tough alloy back of the saw produces a cushion-like effect that absorbs the cutting impact. Dangerous shattering is completely eliminated, while saw breakage is negligible.



High speed steel welded edge

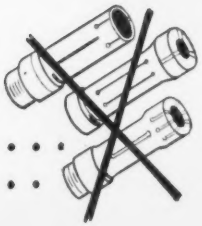
LENOX
THE TOOLS IN THE PLAID BOX

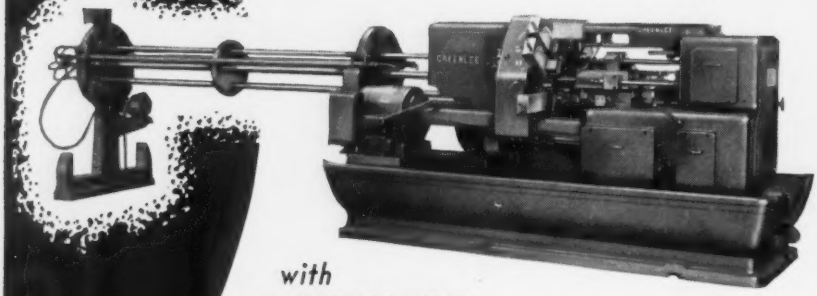
AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASSACHUSETTS • U.S.A.

For more data circle 378 on Postpaid Card

ELIMINATE

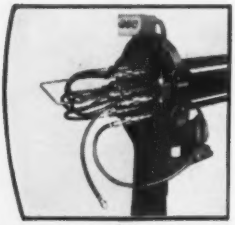
STOCK PUSHERS . . . . . .
FEEDOUT CAMS . . . . . .





with
GREENLEE
AIR-FEED AUTOMATICS

You don't need costly stock pushers and feedout cams with Greenlee Air-Feed Automatics. Air lines are connected to the tubes by quick couplings. Vacuum pumps withdraw pistons for fast restocking. Ask your Greenlee Representative to show you other ways of beating high production costs with Greenlee Air-Feed Automatics.



FAST SET-UPS BECAUSE . . .

- ✓ Wide-open tooling area
- ✓ Interchangeable tool holders
- ✓ Easy-to-change stationary type collets



WRITE FOR CATALOG A-405

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1890 MASON AVENUE
ROCKFORD, ILL.

For more data circle 379 on Postpaid Card



Spark your way to easier, faster dressing with a NORBIDE Dressing Stick

With a NORBIDE Dressing Stick you can see more of the wheel for easier, faster dressing.

The stick causes the wheel to throw out sparks, light up your work. Reduced dressing dust keeps air clear. And the stick's convenient size doesn't obstruct your view. You see the wheel better — avoid costly overdressing.

NORBIDE Dressing Sticks outlast hundreds of ordinary sticks. Made of boron carbide, they approach diamonds in hardness — at a fraction of diamond cost.

Order one today or write for form 1567 giving more details.

NORTON COMPANY, 49 New Bond St., Worcester 6, Massachusetts.



NORTON
BORON CARBIDE

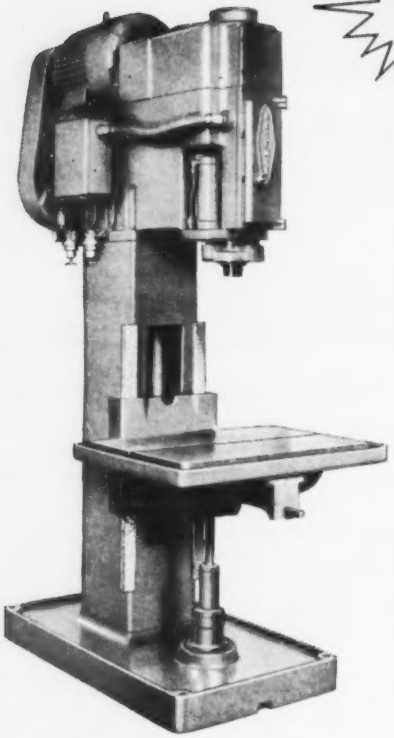
W-1864

Making better products . . . to make your products better

For more data circle 380 on Postpaid Card

ANOTHER NEW TAPPING MACHINE BY

KAUFMAN



MODEL 10E-20

Six features of this new, precision-built Kaufman Tapping Machine are:

1. Lead screw control for accurate threads and maximum tool life. Maximum 4½" lead screw travel.
2. Rapid approach of spindles to work.
3. Clutch operated for faster operation — Reversing spindles at twice forward speed.
4. Six speed transmission providing spindle speeds of 80-350 RPM with 3-1 ratio or 160-700 with 1½-1 ratio clutch.
5. Units provided with 5-7½-10 H.P. Motors.
6. Speeds and H.P. available for highly efficient tapping from 5/16" through 2" NC taps or smaller taps with use of multiple head.

KAUFMAN

For additional information about the new Model 10E-20 or other Kaufman machines for single or multiple operation, write or telephone:

KAUFMAN MFG. CO.

551 S. 29th Street. Manitowoc, Wisconsin

For more data circle 381 on Postpaid Card

Now, Star Band Saw Blades in New

Reel-Pac

DISPENSER

...at no increase in price!



Here's a new way to package band saw blades that makes handling, storing, and measuring a snap. It's Star's unique, unbreakable Reel-Pac containing 100 feet of blade.

To use, all you do is pull out the length you need – and cut off. If you pull out more than you need, you can easily slide it back in on the reel.

Spring tension of the blade won't distort this tough dispenser and there's no danger of blade fouling.

Your STAR distributor now stocks Star blades in the new Reel-Pac dispenser. Call him soon.

1 **Clearly marked with blade size and type. Outline flexible back and gored tooth and skip tooth blades up to ½" now available in easy to use and store Reel-Pac dispenser.**

2 **Free-running Reel-Pac of unbreakable material has special guard shield to protect hands and package from blade teeth.**

STAR HACK SAW and BAND BLADES

Manufactured by

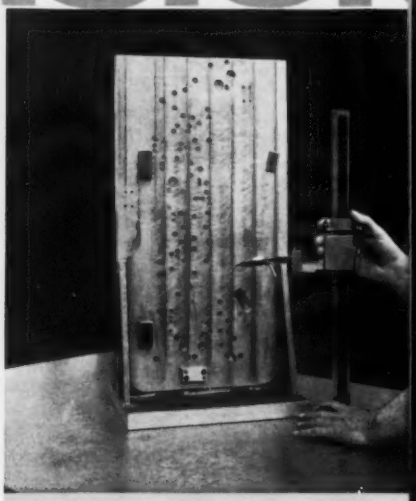
CLEMSON BROS., Inc. · Middletown, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Lawn Machines

For more data circle 382 on Postpaid Card

PRECISION





HOLES LOCATED TO ±.0001", FAST

with Fosdick Automatic Positioning and Direct Dimension Measuring. (Operator sets hole locations direct from blueprint on two direct-reading drum dials.) With B-F Spindle, tools are changed in less than 10 seconds, accurate to ± .0001" of original setting.

"THIS JOB WOULD TAKE 20% LONGER

on our other jig borer, but it couldn't be done with such accuracy. Wouldn't even attempt it without our Fosmatic!"

FOSMATIC JIG BORERS

We asked Textile Machine Works, Reading, Pa., what specific advantages they gained with their new Fosmatic Jig Borer, and here's what they said:

"Time saving? It's hard to say. Might be 20% on one job, 40% on another. But those are just estimates. How can you compare apples and oranges? The Fosmatic and our other jig borer are worlds apart.

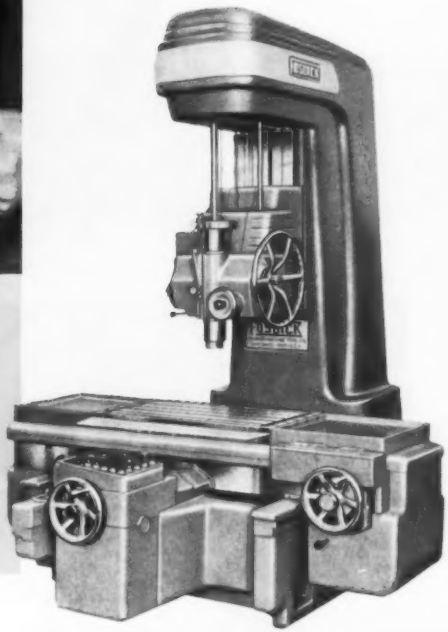
"The important thing is we meet all accuracy requirements *the first time* on our Fosmatic. Rejects are virtually a thing of the past. Moreover, we're doing work on our Fosmatic that we wouldn't even attempt on our other jig borer. The only accuracy problem

For more data circle 383 on Postpaid Card

BORING

OF COMPLEX GAGES AND JIGS





FOSMATIC SAVED US 2 HOURS

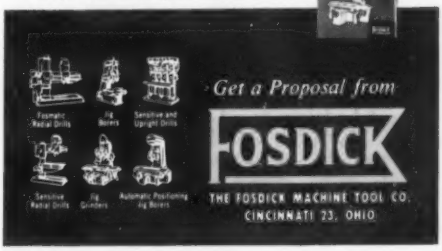
on this 8 hour job, but the accuracy we gained is even more important."

e have now is controlling the temperature of the orkpiece!"

On Fosmatic Jig Borers, positioning accuracy depends pon highest quality gages, not upon screw-threads. his feature and Fosdick's unique anti-friction quill esign assure dependable accuracy. Fosmatic Jig orers bring you many important advances in boring echnology including numerical control by punched ards or tape. Where progress has been so great, the bsolescence of your old machine may be more costly han you suspect. *Why not run a check?* Call your Fosdick Distributor or write us today.

Ask for Fosmatic Jig Borer Bulletin JB-A





The CASE OF THE DISCERNING LATHE BUYER



Which lathe did he buy and why?

For more data circle 385 on Postpaid Card

Mr. Elwood Brandenburg,

tory Superintendent of the Liberty Tool & Die Corporation, Rochester, N. Y., recently made a buying decision. company, a well known manufacturer of precision tools, dies and special machines, needed a 16" toolroom lathe precision work. He wanted versatility, stamina, rigidity and operator convenience . . . and, like all of us, he wanted nake a good buy pricewise. Here's how he made his decision. Can you identify the machines?

he ones he rejected . . .



autiful machine . . .
too many gadgets I won't use.
ce too high."



"Same lathe as pre-War
No improvements.
Looks like our old machines."



"Only began making toolroom lathes since the War. Had none in the area to demonstrate."



leets specifications,
too light-weight and we felt
t low price was not the best value."



"These people only make a 16" lathe now. Can't help but wonder if they're going out of the lathe business."

And the one he chose . . .



"All things considered, 4 points won me over:

1. "*Replaceable* hardened tool steel bedways . . . can't help but feel safer knowing if anything would happen to these basic precision components, they can be quickly replaced as good as new."

2. "Compensating veeway bed design . . . On some of my bigger machines the carriage always rides up off the ways when making a hogging cut. The compensating veeway design distributes forces so this can't happen."

3. "Two-speed tailstock . . . here's a feature that I can really use. It's especially useful for drilling and makes set-up easier, eliminates the bull work."

4. "New design headstock with compensating bearing enables us to use ceramic tooling."

"Those were the *facts* that swayed me over, but there was one other thing . . . call it an 'intangible.' The salesman. Lathe F's representative honestly acted as though he would like to sell me a machine. He was helpful as he could be. He took me to a nearby plant to see his machine in operation. Then, when I asked for the old hard sell . . . he had all the answers. Yes sir, the salesman *is* a factor."

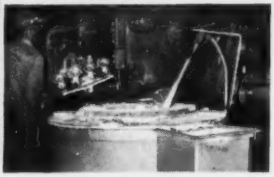
for Mr. Brandenburg's decision, turn to page 257

"For 3 solid years—





Irus Fluid's distinctive yellow color makes it easy to spot and trace leaks.



Complexity of lines (left) and pots of molten metals (above) represent the type of fire hazards requiring Shell Irus Fluid 902.

No hydraulic fluid fires

No worker injury

No equipment damage —since we switched over to **SHELL IRUS FLUID 902"**

says Ernie Ike, Plant Superintendent
Western Die Casting Co., Emeryville, Calif.

According to Mr. Ike, these results are directly due to the switch-over in 1955 to Shell Irus Fluid 902.

Irus® Fluid 902 is a water-in-oil emulsion with relatively high water content. Irus actually snuffs out fire, *under plant conditions.*

Another important advantage of Irus Fluid 902 is its low cost. Irus Fluid costs up to one-third less than other fire-resistant fluids . . . yet is comparable in performance in every practical respect.

For information on Irus Fluid 902, write Shell Oil Company, 50 West 50th St., N.Y. 20, N.Y. or 100 Bush St., San Francisco 6, Calif.

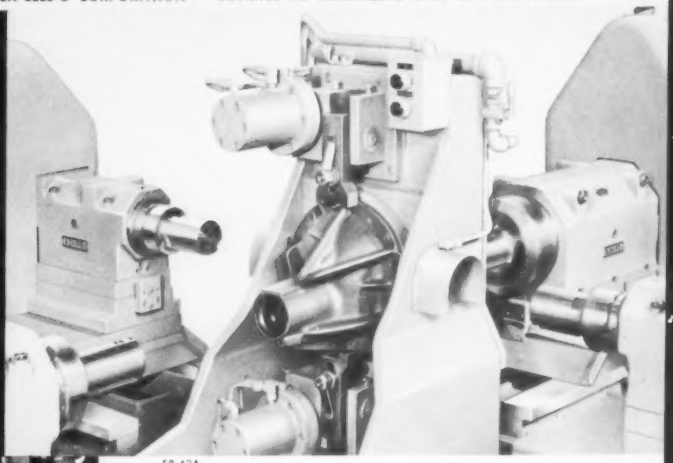
SHELL IRUS FLUID 902

a low cost, fire-resistant hydraulic fluid

For more data circle 387 on Postpaid Card

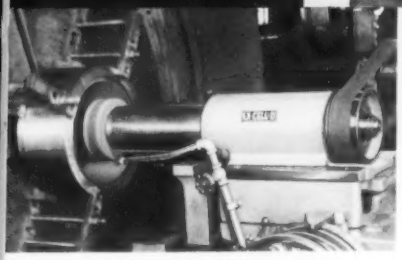
EX-CELL-O Precision Production News

COST-CUTTING IDEAS FROM EX-CELL-O CORPORATION — DEVOTED TO MINIMIZING COST OF PRODUCTION

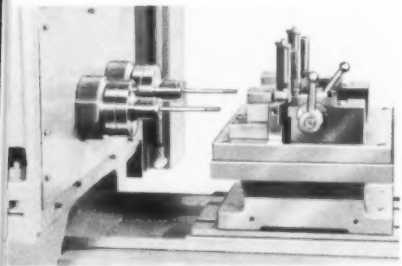


Exacting limits are held by Ex-Cell-O Precision Spindles boring pinion bearings and cross hole in this automotive differential carrier. Pre-loaded ball bearing construction of Ex-Cell-O Spindles plus sealed lubrication insure long life and low maintenance.

58-42A



Internal grinder uses belt-driven spindle to grind 10" I.D. to closest tolerances. Belt-driven Ex-Cell-O Precision Spindles are available in a full range of speeds up to 25,000 rpm.



Two Ex-Cell-O Precision Spindles are used in this Bor-Drilling setup to drill jet engine blades with extreme accuracy. Ex-Cell-O Spindles hold critical limits in either ferrous or non-ferrous metals.

Do More Jobs— More Accurately

Standard Ex-Cell-O Precision Boring and Grinding Spindles cut costs in precision production

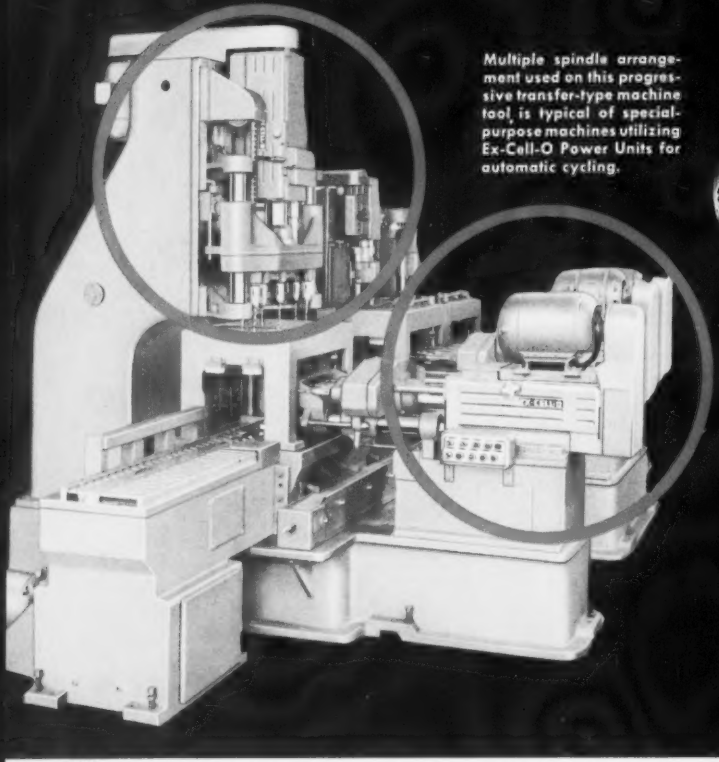
Installed as original equipment or as replacement components, standard Ex-Cell-O Precision Spindles put job-engineered efficiency into every job—surface grinding, I.D. grinding, precision boring and other applications.

Whatever the type—belt driven, air driven or motorized, designed for standard current or high frequency applications—Ex-Cell-O Spindles have earned an enviable reputation throughout the world for precision and versatility, for long-lasting operation, and for production savings.

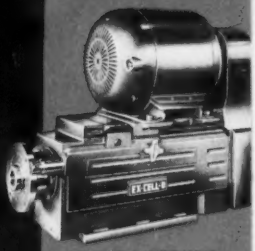
Pre-loaded ball bearing construction, absence of vibration and chatter and low maintenance make Ex-Cell-O Spindles first choice for close-tolerance, fine-finish work. Spindles also are available with heavy duty bearings for roughing and semifinishing operations.

Your local Ex-Cell-O Representative can give you all the details, or write direct.

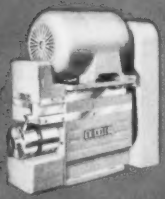
3 MORE COST-CUTTING IDEAS



Multiple spindle arrangement used on this progressive transfer-type machine tool is typical of special-purpose machines utilizing Ex-Cell-O Power Units for automatic cycling.



STYLE 28-A HYDRAULIC POWER UNIT



STYLE 22 QUILL-TYPE HYDRAULIC POWER UNIT



STYLE 20 HYDRAULIC POWER UNIT

58-428

POWER

for Changing Production Needs

EX-CELL-O QUILL-TYPE HYDRAULIC POWER UNITS CAN BE USED OVER AND OVER AGAIN, PUTTING POWER WHERE YOU NEED IT, WHEN YOU NEED IT

Ex-Cell-O Hydraulic Power Units lower manufacturing costs even on short and medium runs by performing a variety of jobs—adapting quickly to your changing production requirements.

Used to actuate single tools or multiple spindle heads for drilling, counterboring, facing, reaming and other operations, they are designed as a compact "power package" to permit close center distances when used in-line or when rearranged and positioned radially around a fixture.

Suited to many applications, including special machines with automatic cycling, Ex-Cell-O Power Units are self-lubricated, easily installed, and they're built with famous Ex-Cell-O precision for trouble-free, long-lasting service.

Call your local Ex-Cell-O Representative or write Ex-Cell-O, Detroit, for details on the full line of Hydraulic Power Units.

This is cost-cutting— with CTW Carbide Broaches

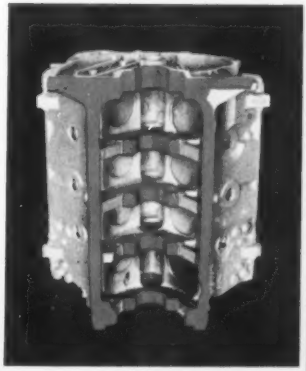
Continental Broaches increase output and reduce downtime in automobile engine block production

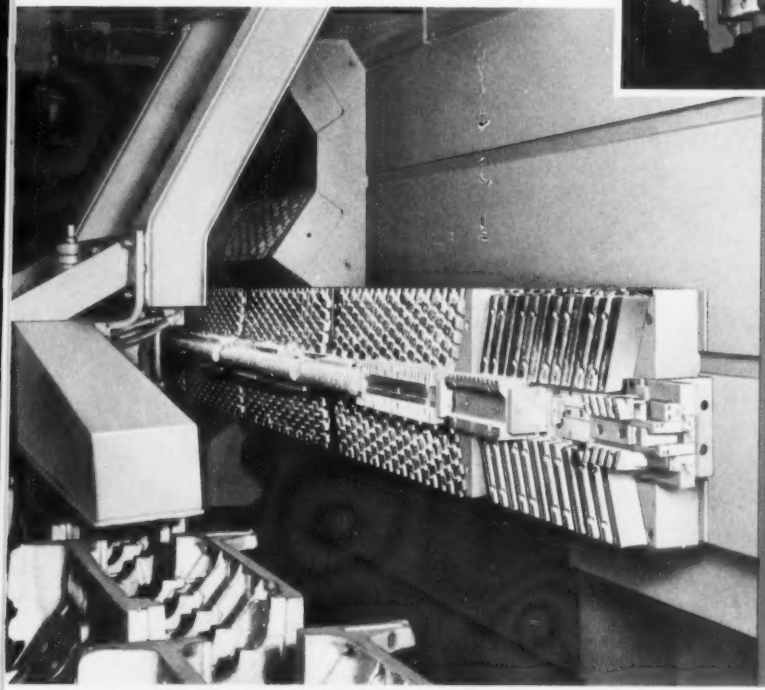
Greater production with less downtime are just two of the important reasons why a large automobile manufacturer uses Continental tooling for broaching of pan rail, half bores, bearing locks and parting faces of V-8 engine blocks.

Removing a maximum 3/16" stock in a single pass, this five-section, combination half-round and face broach uses carbide-tipped tool bits and broach inserts to semifinish and finish 20,000 to 22,000 cast-iron blocks between tool resharpening.

This automotive operation proves again why the production savings made possible by Continental tooling makes the "best cost less" than ordinary broaches.

58-42C





Above: In a single pass, multiple surfaces of this cast-iron engine block are semifinished and finished. Maximum stock removal is 3/16".

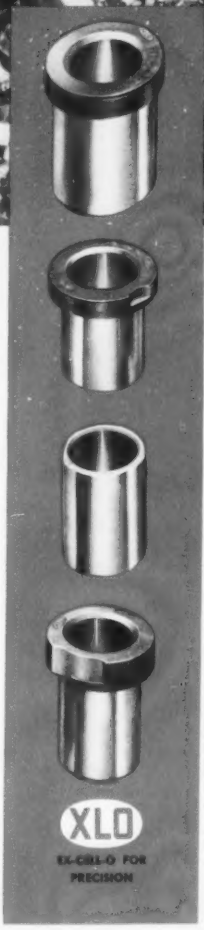
Left: Continental Broaches used in this horizontal surface broach machine are made up of five sections combining half-round and facing broaches. Tool bits and broach inserts are 100% carbide-tipped.

CONTINENTAL TOOL WORKS division of EX-CELL-O CORPORATION

EX-CELL-O PRECISION PRODUCTION NEWS



58-42D



Make the scrap-pile test!

Start using Ex-Cell-O Drill Jig Bushings today—then watch how worn-out bushings disappear from your scrap-pile!

The reason is simple: Ex-Cell-O Drill Jig Bushings last longer because they're made better!

The answer lies in the chrome-alloy bearing steel used in Ex-Cell-O Bushings; in up-to-date automatic heat treating methods; in hole hardness quality-controlled to uniform 62-64 Rockwell "C"; and in Ex-Cell-O's own high standards for precision-ground finish inside, outside and under the head for perfect seating.

All this—plus immediate delivery to your plant from the large Drill Jig Bushing inventories Ex-Cell-O maintains at key points throughout the country.

You get fast service on special sizes, too, because Ex-Cell-O stocks many semifinished bushings in addition to the more than 10,000 standard sizes always on hand.

For "same-day" shipment, order from Ex-Cell-O Corporation at Detroit, New York, Cincinnati, Downey, Calif., or London, Canada. Call your local Ex-Cell-O Representative or write direct for an Ex-Cell-O Drill Jig Bushing catalog today.

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES CUTTING TOOLS • TORQUE ACTUATORS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



Biggest news in years—for band saw users...

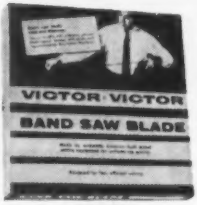
NOW Victor BLADES

come packaged in NEW easy-to-use REEL-PAC dispenser...

You get much more — at no extra cost — when you buy Victor Band Saw Blades. Each 100-foot blade comes in a strong, plastic Reel-Pac — the handiest way to package blades you ever saw.

A special shield keeps the reel free-running—protects hands and package from blade teeth. Blade tension won't cause distortion or blade fouling. You can easily slide back any extra blade after you've measured off what you want.

Victor Outline Flexible Back, Gored Tooth and Skip Tooth Blades, clearly labeled with type and size, now come in Reel-Pac dispenser in sizes up to and including ½". Your Victor distributor has them now. See him soon.



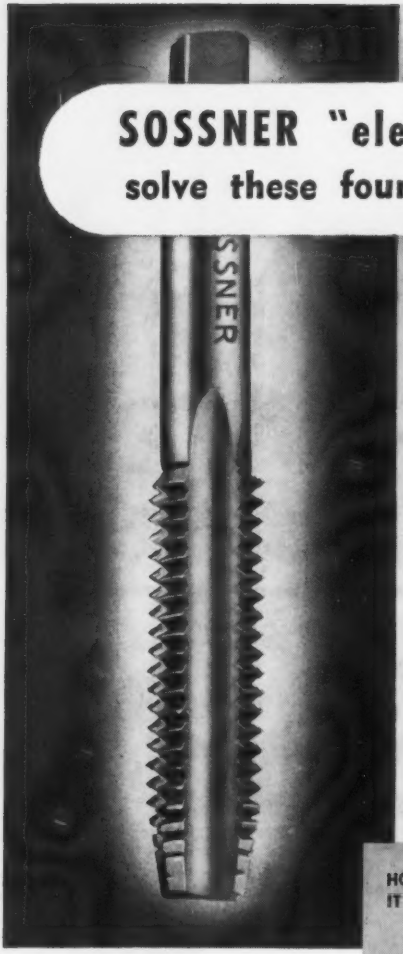
VICTOR SAW WORKS, INC.
Middletown, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades

© 1958

For more data circle 389 on Postpaid Card

SOSSNER "elektraLUBE" TAPS*
solve these four tapping problems!



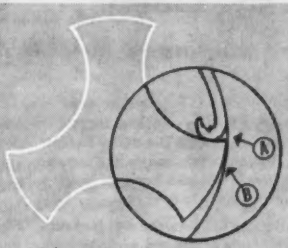
- ~~PICK UP~~
- ~~LOADING~~
- ~~WELDING~~
- ~~GALLING~~

What is "elektraLUBE"?

"elektraLUBE" is an exclusive SOSSNER development. Briefly, "elektraLUBE" is a highly ductile lubricating deposit firmly bonded to the surface of the tap and anchored into the ground pores. Under working pressures, this deposit is further compressed into the pores and burnished to a bright, slippery consistency. "elektraLUBE" takes over as a super lubricant where conventional lubricants stop functioning.

*"elektraLUBE" Taps are manufactured only by SOSSNER.

HOW DOES IT WORK?



High pressures at A & B (see sketch) force out any conventional lubricant. "elektraLUBE" is an integral part of the tap and remains to provide permanent lubrication between tap and work piece.

SOSSNER TAP & TOOL CORPORATION
29 BROADWAY, LYNBROOK, L. I., N. Y.

Inquiries from representatives and distributors are invited.

Factory Warehouses In
New York and Los Angeles
Dealer Stocks In Other Cities

For more data circle 390 on Postpaid Card

Acme-Fette rolls threads to tight "specs"



...WITHOUT MAJOR INVESTMENT

The tool engineers of Air-Hydraulic, Inc. were faced with rigid specifications and the necessity of an extremely fine fit and finish for this high temperature hydraulic actuator for aircraft use. Conventional thread cutting methods would have been costly.

After careful study they found that Acme-Fette thread rolling heads would meet all requirements when applied to their *existing turning equipment*. Major machine investment was eliminated and a low rejection rate meant additional economies because threading was the last of a number of costly operations.

The Results

- 1"-20, ¼"-16, and ⅛"-24 threads were rolled 5 times faster than possible with conventional thread cutting dies —thread rolling speeds are equal to turning speeds with high speed tool steels.
- Cold-forming action of the Acme-Fette produced a tougher thread and one 60% smoother than grinding or chasing (a 5 micro-inch finish).
- Rejection rate: less than ⅓ of 1%.

The Material

- Steel: 4340 –upset forging
- Tensile strength: over 160,000 p.s.i.
- Hardness: 36-40 on Rockwell C scale

For cost-reducing ideas showing how you can put Acme-Fette self-opening thread rolling heads to work on your present equipment, send for Bulletin NAF-57A.

National Acme

THE NATIONAL ACME COMPANY
183 East 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

For more data circle 391 on Postpaid Card

NEW Gear Hobbing Machine Is Fully Automatic!



Koepfer 170 Gear Hobber

Koepfer 170

Hobbing of spur, helical and worm gears; worms; or any profile that can be generated . . .

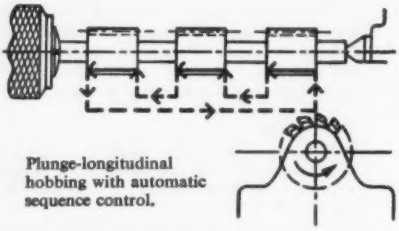
Magazine feeding attachment providing fully automatic loading, chucking and hobbing—greatly reducing machine set-up and handling time . . .

Semi-automatic operation for small runs—with foot pedal opening chucking device . . .

Automatic sequence control—permitting pre-selection by control switches for either longitudinal hobbing, plunge hobbing or combined plunge-longitudinal hobbing.

	without magazine feed	with magazine feed
Max. pitch to be cut	DP 10	DP 10
Max. dia. of blank	5⅛″	1¾″
Largest face	6″	4⅜″
Min. teeth to be cut	6(1)*	6(1)*

*Special attachment for cutting less than 6 to single-start worms



Plunge-longitudinal hobbing with automatic sequence control.

Write For Additional Information

COSA — *nationwide sales and service of precision machine tools—from bench lathes to boring mills.*

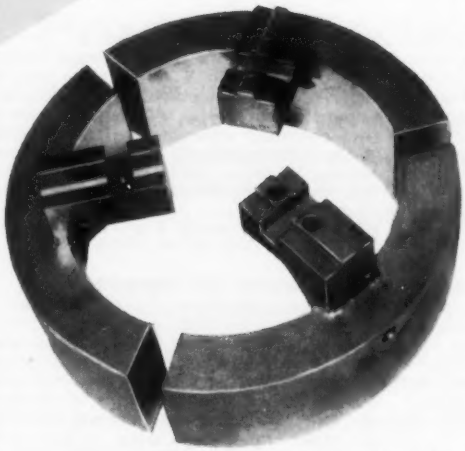
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

For more data circle 392 on Postpaid Card

SPECIALS
made
to your
SPECIFICATIONS

SOFT BLANK TOP JAWS
for all chucks
Made to AMERICAN Standards

immediate
delivery
on
STANDARDS



Soft Blank Top Jaws may be used on any chuck having master jaws. Both medium and heavy duty styles are carried in stock and made from 1020 steel.

SAVE OVER 50%

Write today for prices

HURON MACHINE PRODUCTS, INC.

6252 MONROE BLVD. DEARBORN, MICHIGAN

For more data circle 393 on Postpaid Card

free literature

free literature

Use Postpaid Cards opposite page 32 and inside back cover for requesting free copies of literature listed below.

Lead Screws
Wedin Corp., Box 37, Detroit 20, Mich. This four page bulletin gives detailed information of Wedin Lead Screws, which are ground to stay accurate longer.
For more data circle 1 on Postpaid Card

Punch Adapter
Harig Manufacturing Co., 5765 West Howard St., Chicago 31, Ill. This flyer features information on the Harig Ball Seat Punch Adapter, which is a precision attachment that locates and clamps ball seat punches for grinding in Harig Grind-All Fixture. The bulletin further describes the Harig Grind-All Radius Dresser Arm, which is an attachment that quickly converts the Grind-All Fixture into a precision radius dresser.
For more data circle 2 on Postpaid Card

Gear Driven Drilling Machine
The I. O. Johansson Co., 7252 St. Louis Ave., Skokie, Ill. This four page bulletin describes and illustrates the Johansson Gear Driven Drilling Machine that has a 30 inch swing and 1¾ inch drill capacity. Specifications for this drill are given, as well as illustrations of several other types of drilling machines made by the company.
For more data circle 3 on Postpaid Card

Threading Machines
Landis Machine Co., Waynesboro, Pa. Bulletin H-76-2 fully illustrates and describes the Model C Landmaco Threading Machines, which are available in five sizes, covering a range of ¼ inch to 2½ inches in single or double spindle models.
For more data circle 4 on Postpaid Card

Bactericide
Cincinnati Milling and Grinding Machines, Inc., Cincinnati Milling Products Division, Cincinnati 9, Ohio. Brochure entitled "Cimcool Bactericide '00' Wafers" outlines the features of this bactericide for treatment and protection against rancid cutting fluids.
For more data circle 5 on Postpaid Card

Boring and Milling Machine
Marac Machinery Corp., 45 South Broadway, Yonkers, N. Y. A 12 page catalog describes the first machine tool on which numerical control is offered as standard (not optional) equipment. This machine is the Schwartzkopff KBF2 Boring and Milling Machine, which combines production room ruggedness with near jig borer accuracy.
For more data circle 6 on Postpaid Card

Importance of Tool Sharpening
The Heald Machine Co., Worcester 6, Mass. "How To Ruin a $50,000 Machine" is the title of a new 32 page illustrated booklet for production superintendents and machine operators. It uses melodrama to point out three ways of destroying the effectiveness of boring machines or other machines using single point tungsten carbide cutting tools.
For more data circle 7 on Postpaid Card

Deep Hole Drilling Machine
Lahr Machine and Tool Corp., 3400 Maplewood Ave., Toledo 10, Ohio. This bulletin gives complete information on the Lahr Deep Hole Drilling Machine, which is tape controlled by Probomat.
For more data circle 8 on Postpaid Card



Sentry-Hardened Tools Produce Better...Longer!

Sentry quality-controlled hardening assures peak performance from all types of high carbon, high chrome or high speed steel production tools.

The constant Diamond Block Atmosphere employed in Sentry Model "Y" heat treating furnaces is truly neutral. All steels hardening above 1700°F can be soaked to insure maximum hardness without danger of scale or decarburization.

Sentry equipment is simple in operation, and results are duplicated day in and day out consistently . . . without spoilage.

Only a demonstration hardening can really show you Sentry quality. Send us your tools for free sample hardening.

Visit our operating exhibit, Booth 936, Cleveland Metals Show, October 27-31, 1958.



383-8

Sentry TRADEMARK **ELECTRIC FURNACES**

Request Catalog U-23 • *Write* **THE SENTRY CO., FOXBORO, MASS.**

For more data circle 394 on Postpaid Card

free literature . . . *(For free literature use postpaid card opposite inside back cover)*

Tube Furnaces
Hevi-Duty Electric Co., Milwaukee 1, Wis. This flyer describes and illustrates the Hevi-Duty Molybdenum Tube Furnaces with temperatures to 3,000 degrees Fahrenheit.
For more data circle 9 on Postpaid Card

Workholders
Lassy Tool Co., Plainville, Conn. Illustrated catalog gives information on Lassy Workholders, which maintain repetitive work alignment and accuracy.
For more data circle 10 on Postpaid Card

Boring Machine
Ex-Cell-O Corp., Detroit 32, Mich. A completely new bulletin on way type precision boring machines, which have been designed on the building block principle.
For more data circle 11 on Postpaid Card

Carbide Pricing Procedure
Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa. This catalog incorporates the company's new pricing system on its tungsten carbide tips, tool, and inserts. The new system adjusts the price of these items in line with current costs.
For more data circle 12 on Postpaid Card

Twist Drills
Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9, Ohio. A humorously illustrated "refresher course" in good drilling practice, "You're On The Road To Better Drilling," shows how improved precision and economy may be obtained in drilling operations.
For more data circle 13 on Postpaid Card

Form and Punch Shaper
Jersey Manufacturing Co., 442 Livingston St., Elizabeth 1, N. J. Illustrated literature concerning universal shaping machine for producing contours, surfaces and punches with curved necks, brass electrodes, die sections and machine components, in one setup.
For more data circle 14 on Postpaid Card

Taper Attachment
Master-Taper Co., 4531 North Clark St., Chicago 40, Ill. This flyer describes the Master-Taper Attachment for all lathes.
For more data circle 15 on Postpaid Card

Automatic Saw Sharpener
Hamco Machines, Inc., 99 Mt. Hope Ave., Rochester 20, N. Y. This four page bulletin completely describes the company's automatic saw sharpener, which will accommodate circular, hack or band saws.
For more data circle 16 on Postpaid Card

Test Indicator
Federal Products Corp., 8144 Eddy St., Providence 1, R. I. A series of Testmaster Test Indicators is completely described in this new leaflet.
For more data circle 17 on Postpaid Card

Steel Shelving
Aurora Equipment Co., Equipto Division, 606 Prairie Ave., Aurora, Ill. Complete reference manual No. 485 for steel equipment includes such items as shelving, bins, drawer units, lockers, benches, counters and trucks.
For more data circle 18 on Postpaid Card

Bending Machines
Pines Engineering Co., Inc., 644 Walnut, Aurora, Ill. Catalog 356 contains complete information on Pines Bending Machines for tubing, pipe, extrusions and rolled sections.
For more data circle 19 on Postpaid Card

Drilling and Tapping Head
Chicago Quadrill Co., 1854 Busse Highway, Des Plaines, Ill. Information on the Quadrill four position drilling and tapping turret head, which does the work of four drill presses. It drills, reams, countersinks and counterbores without setting up each time.
For more data circle 20 on Postpaid Card

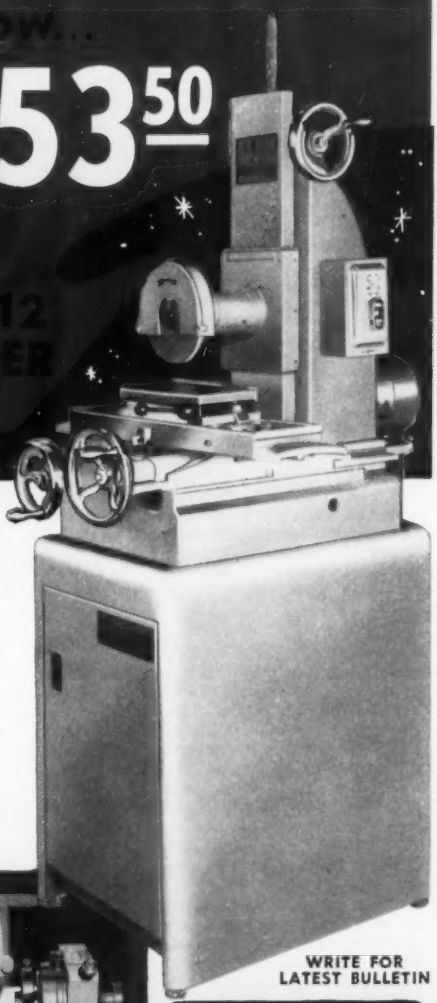
Cut-Off Blades
The Cleveland Twist Drill Co., 1242 East 49th St., Cleveland 14, Ohio. This flyer describes and illustrates the company's improved line of Mo-Max ground tee shaped cut-off blades.
For more data circle 21 on Postpaid Card

Universal Micrometer
Polyplan Co., 45 West 81st St., New York 24, N. Y. Four page bulletin describes a new Swiss Universal Micrometer, with interchangeable and movable anvils.
For more data circle 22 on Postpaid Card

DID YOU KNOW...

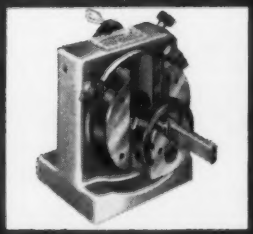
only $1,053.50

for the HARIG-TML 6 x 12 SURFACE GRINDER

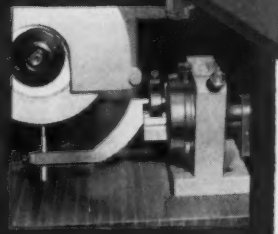


Now! Equip your tool-room with the most accurate, dependable surface grinder available. Out-performs many similar makes costing far more. Made by grinding specialists to assure you of superior results—time after time!

- Solid one piece construction of spindle housing and verticle slide.
- Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- Angular rack and pinion face.
- Motorized spindle, dust collector and water unit available.



HARIG GRIND-ALL FIXTURE
For fast, accurate perforator grinding . . . milling, boring and inspection.



NEW! RADIUS DRESSER ARM
Quickly converts Harig's Grind-All Fixture into a precision Radius Dresser.

WRITE FOR LATEST BULLETIN

Harig
Manufacturing Corp.

5765 W. HOWARD ST. • CHICAGO 31, ILL.

For more data circle 395 on Postpaid Card

free literature . . . *(For free literature use postpaid card opposite inside back cover)*

Twist Drills
Union Twist Drill Co., Athol, Mass. Four page bulletin gives complete information on Union Straight Shank Twist Drills, including fractional, wire gauge and letter sizes.
For more data circle 23 on Postpaid Card

Mechanical Tubing
Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. This informative six page folder explains how smooth inner diameter welded carbon steel tubing is produced so as to enable the fabricator to cut production time and reduce costs in the manufacture of hydraulic cylinders.
For more data circle 24 on Postpaid Card

Wet Blast Honer
Tobin-Arp Manufacturing Co., 6400 Penn Ave., South, Minneapolis 23, Minn. This flyer describes and illustrates the Liqui-Breez Wet Blast Honer for honing all types of cutting tools.
For more data circle 25 on Postpaid Card

Separator
Stearns Magnetic Products, 635 South 28th St., Milwaukee 46, Wis. Bulletin No. 1051 is an eight page color bulletin that gives information on the Indox V Drum Separator for continuous and automatic removal of tramp iron in process industries.
For more data circle 26 on Postpaid Card

Milling Cutters
McCrosky Tool Corp., Meadville, Pa. Bulletin No. 582 describes construction of cutters using square and triangular carbide inserts. It lists sizes and dimensions of standard shell end, face and half side mills. In addition, it illustrates the variety of specials designed to meet unusual requirements.
For more data circle 27 on Postpaid Card

Hand Tapper
Tools, Inc., 1734 North 25th Ave., Melrose Park, Ill. This flyer illustrates, describes and gives specifications of the Allman Floor Model Hand Tapper and the Allman Bench Model Hand Tapper.
For more data circle 28 on Postpaid Card

Grinding Fixture
M-M Tool Manufacturing Co., Dayton 2, Ohio. Four page bulletin gives information on the Roto-Grind Precision Grinding Fixture, which can be used on surface or jig grinders.
For more data circle 29 on Postpaid Card

Diamond Wheels
Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa. This complete catalog (Form ESA-290) contains consumer net prices for man-made diamond wheels in resinoid and vitrified bonds and natural diamond wheels in metal bond.
For more data circle 30 on Postpaid Card

Die Casting Machines
The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio. General bulletin gives detailed descriptions and specifications of Cleveland Die Casting Machines, Models 50, 200, 400-N, 650, 800 and 1,000, representing machines ranging in locking pressures from 50 to 1,000 tons.
For more data circle 31 on Postpaid Card

O.B.I. Presses
Sales Service Machine Tool Co., 2361 University Ave., St. Paul 14 A, Minn. Bulletin describes the 40 ton o.b.i. press, which features steel frame weldment that provides generous ram and bed areas and depth of throat to accommodate large die sets.
For more data circle 32 on Postpaid Card

Motorized Spindles
The Cincinnati Electrical Co., 367 Mt. Hope Ave., Cincinnati 4, Ohio. Catalog S-58 contains descriptive information and illustrations of motorized spindles from ½ to 10 h.p. Also illustrated and described are belt driven spindles, feeds, slides and a complete line of accessories.
For more data circle 33 on Postpaid Card

Relief Grinding Fixture
Steptool Corp., 3613 East Olympic Boulevard, Los Angeles 23, Calif. This bulletin covers two case histories of performance and describes the grinding fixture used for grinding Helixpoints on drills from No. 80 through 1 inch diameter.
For more data circle 34 on Postpaid Card

From cutters to taps

a complete line



is the shortest distance to top production

From inspection to service — the complete line of Butterfield cutting tools helps you make the most of your product — and production.

There are Butterfield warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

See your Butterfield Distributor for precision-made drills, reamers, taps, dies, cutters, end mills, hobs, and carbide tools.



BUTTERFIELD

. . . the cutting tools that make the most of your product

BUTTERFIELD DIVISION, UNION TWIST DRILL COMPANY, DERBY LINE, VERMONT

For more data circle 396 on Postpaid Card



For more data circle 397 on Postpaid Card

free literature . . . *(For free literature use postpaid card opposite inside back cover)*

Small Motors
Barber-Colman Co., 666 Rocks St., Rockford, Ill. Catalog U-1 is a new a.c. shaded pole motor catalog which features extensive information on unidirectional non-geared motors.
For more data circle 35 on Postpaid Card

Saw Blade Price Selector
The Capewell Manufacturing Co., Hartford 2, Conn. A new 20 page Consumer Net Price Selector covers the Capewell line of hand and power hack saws, hole saws, band saws, hammers and ground flat tool steel.
For more data circle 36 on Postpaid Card

Eccentric Geared Presses
Niagara Machine and Tool Works, Buffalo 11, N. Y. Bulletin 66A presents the modernized Niagara Series SE Straight Side, Single Action, Eccentric Geared Presses for large, heavy tonnage drawing, punching and blanking work.
For more data circle 37 on Postpaid Card

Drilling and Tapping Attachment
The Dumore Co., 1302 Seventeenth St., Racine, Wis. Bulletin No. 2468 A gives technical details on the Multi-Drill, which is a new multiple spindle drilling and tapping attachment.
For more data circle 38 on Postpaid Card

Hand Milling Machine
Northern Illinois Machinists, Crystal Lake Rd., McHenry, Ill. Four page bulletin describes the L M G-Mill which provides fast, accurate milling of small parts. This unit can be converted to surface grinding.
For more data circle 39 on Postpaid Card

Machine Bit
General Electric Co., Metallurgical Products Department, 11177 East Eight Mile Rd., Detroit 32, Mich. Catalog and specification sheets on the new CC-11 machine bit, 1½ inch gage, are now available.
For more data circle 40 on Postpaid Card

Thread Rolling Machines
Mettler Machine Tool, Inc., 157 Adeline St., New Haven, Conn. Catalog sheet gives full information on the Shuster Thread Rollers, which are of the reciprocating die type.
For more data circle 41 on Postpaid Card

Auto-Collimator
Opto-Metric Tools, Inc., 137MM Varick St., New York 13, N. Y. Catalog 85/200 gives information on the Leitz Precision Auto-Collimator.
For more data circle 42 on Postpaid Card

Surface Grinders
Gallmeyer and Livingston Co., 408 Straight Ave., Southwest, Grand Rapids, Mich. This 24 page book gives complete information on the company's line of Grand Rapids Surface Grinders.
For more data circle 43 on Postpaid Card

Carbon Vanadium Punches
Pivot Punch and Die Corp., North Tonawanda, N. Y. Catalog gives information on a complete line of carbon vanadium punches, made to precision standards.
For more data circle 44 on Postpaid Card

Coolant System
Edlund Machinery Co., 32 Huntington St., Cortland, N. Y. Descriptive literature illustrates the Model 2HPC High Pressure Coolant System.
For more data circle 45 on Postpaid Card

Induction Heaters
Lindberg Engineering Co., High Frequency Division, 2450 West Hubbard St., Chicago 12, Ill. Bulletin No. 1441 gives information on the Lindberg line of RF Type Induction Heaters.
For more data circle 46 on Postpaid Card

Limit Switches
The National Acme Co., 189 East 131st St., Cleveland 8, Ohio. This 12 page Bulletin EM-5824 describes the Snap-Lock Series D-2400 Heavy Duty Limit Switches.
For more data circle 47 on Postpaid Card

Milling Cutters and End Mills
The OK Tool Co., Inc., Milford, N. H. This flyer describes the product line of milling cutters and end mills and the historical development of the company.
For more data circle 48 on Postpaid Card

Reduce Work Spoilage,
Increase Output,
Improve Precision —

by IN-PROCESS INSPECTION with P&W COMPARATORS

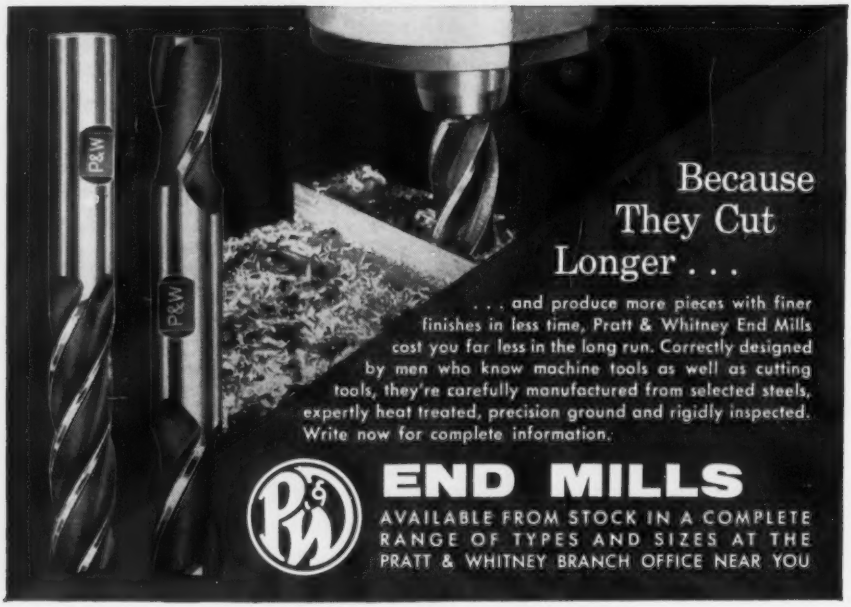
Because Pratt & Whitney manufactures a complete line of Air, Electric and Mechanical comparators, they are in a position to make an impartial survey of your inspection needs, to recommend—and supply—the best possible type and model for YOUR specific requirements.

Write now for product literature. Pratt & Whitney Company, Inc., 25 Charter Oak Boulevard, West Hartford, Conn.



PRATT & WHITNEY
FIRST CHOICE FOR ACCURACY
MACHINE TOOLS • GAGES • CUTTING TOOLS

For more data circle 398 on Postpaid Card



For more data circle 399 on Postpaid Card

free literature . . . *(For free literature use postpaid card opposite inside back cover)*

Precision Tool Cases
Micro-Safe Co., 200 Oakview Drive, Kettering 29, Ohio. This flyer describes and illustrates Micro-Safe Precision Tool Cases, which offer protection for precision tools.
For more data circle 49 on Postpaid Card

Belt Grinders
Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich. Bulletin 336-T describes and illustrates the Model UBG-50 Universal Belt Grinder and Bulletin 337-T gives complete information about Hammond Abrasive Belt Grinders.
For more data circle 50 on Postpaid Card

Power Screwdriver
Detroit Power Screwdriver Co., 2807 West Fort St., Detroit 16, Mich. This bulletin describes and illustrates the Model U Universal Power Screwdriver.
For more data circle 51 on Postpaid Card

Angle Bending Gage
Greenlee Tool Co., 1988 Herbert Ave., Rockford, Ill. Pamphlet describes and illustrates the No. 1802 Angle Bending Gage, which is a timesaver for any pipe and conduit bending.
For more data circle 52 on Postpaid Card

Grinding Wheel Adapters
Wm. Sopko and Sons Co., 140 East 267th St., Euclid 32, Ohio. Illustrated catalog on grinding wheel adapters and toolroom accessories.
For more data circle 53 on Postpaid Card

Precision Filing Machine
All American Tool and Manufacturing Co., 8043 North Lawndale Ave., Skokie, Ill. This four page bulletin describes and illustrates a precision filing machine that files, saws and hones. The bulletin further lists the specifications, features and accessories for this machine.
For more data circle 54 on Postpaid Card

Abrasive Cutting Center
American Chain and Cable Co., Inc., Allison-Campbell Division, 931 Connecticut Ave., Bridgeport 2, Conn. This comprehensive six page folder (DH-20) describes the company's new demonstration laboratory.
For more data circle 55 on Postpaid Card

Instrument Bench Centers
Taft-Peirce Manufacturing Co., Woonsocket, R. I. Bulletin No. St-005 contains complete data on the No. 9205M Instrument Bench Centers.
For more data circle 56 on Postpaid Card

Rotary Files
Rota File Corp., 1974 Sixty-Sixth St., Brooklyn, N. Y. Catalog on ground cut rotary files for soft metals.
For more data circle 57 on Postpaid Card

Stampings
Federal Tool and Manufacturing Co., 3615 Alabama Ave., Minneapolis 16, Minn. Bulletin 301 is entitled "More for Your Short Run Stamping Dollar."
For more data circle 58 on Postpaid Card

Lathe Tracer Attachment
True-Trace Sales Corp., 9830 East Rush St., El Monte 38, Calif. Complete details and literature on a lathe tracer attachment, which provides wide versatility and use by both skilled and unskilled operators.
For more data circle 59 on Postpaid Card

Wrench Engineering Data
Lowell Wrench Co., Department M-85, Worcester, Mass. Data sheets show that Lowell Wrenches can be modified to meet particular requirements.
For more data circle 60 on Postpaid Card

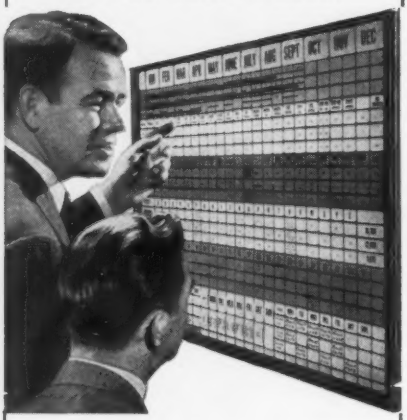
Drilling Machines
Leland-Gifford Co., Worcester 1, Mass. Bulletins completely describe and illustrate the company's line of standard and special sensitive and hydraulic feed drilling machines.
For more data circle 61 on Postpaid Card

Profiler
Tool-Lab, Inc., Escondido, Calif. This four page bulletin describes and illustrates the Pruitt P-500 Profiler for routing, duplicating and grinding.
For more data circle 62 on Postpaid Card



For more data circle 400 on Postpaid Card

How To Get Things Done Better And Faster



BOARDMASTER VISUAL CONTROL

- ☆ Gives Graphic Picture — Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ☆ Made of Metal. Compact and Attractive. Over 300,000 in use.

Complete price $49.50 including cards

FREE 24-PAGE BOOKLET NO. MS-30 Without Obligation

Write for Your Copy Today

GRAPHIC SYSTEMS

55 West 42nd Street • New York 36, N. Y.

For more data circle 401 on Postpaid Card

free literature . . .

Magnetic Vise Jaw Liners
Severance Tool Industries, Inc., 724 Iowa St., Saginaw, Mich. Bulletin No. 23 VJ provides information on the Severance Magnetic Vise Jaw Liners for protecting clamped work.
For more data circle 63 on Postpaid Card

Honing Machine
Superior Hone Corp., 1615 Elreno St., Elkhart, Ind. Descriptive, illustrative literature and price information concerning the Superior "AM" Tri-Purpose Honing Machine.
For more data circle 64 on Postpaid Card

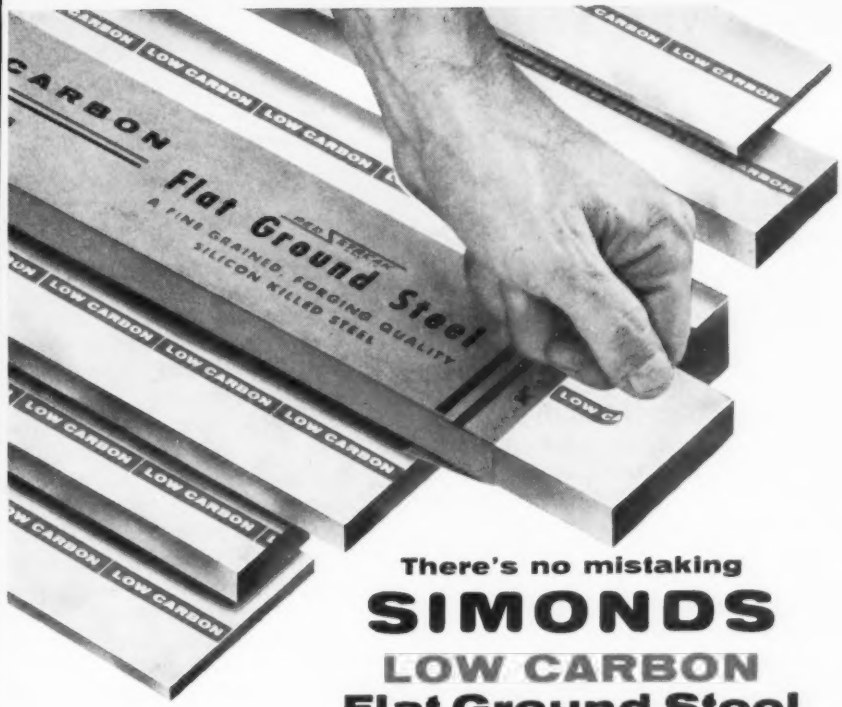
Torque Wrenches
P. A. Sturtevant Co., Addison, Ill. This torque wrench manual contains formulae, applications, engineering data, screw torque data, adapter problems and general principles.
For more data circle 65 on Postpaid Card

Precision Rotary Tables
Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. This 23 page bulletin describes and illustrates the P and W line of precision rotary tables and how to reduce costs and improve precision in circular spacing and angular positioning.
For more data circle 66 on Postpaid Card

Air Gage Members
Freeland Gauge Co., 9940 Freeland Ave., Detroit 27, Mich. A 20 page manual type brochure describes air gage members for all types of circuits.
For more data circle 67 on Postpaid Card

Air Control Valves
Air Valves Co., 22729 Hoover Road, Warren, Mich. Catalog 58 describes and illustrates A.V.C.O. Air Control Valves and the advantages of same.
For more data circle 68 on Postpaid Card

Hydraulic Tracer Lathe
Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill. Circular describes the Sundstrand Model 14T Multi-Cycle Hydraulic Tracer Lathe.
For more data circle 69 on Postpaid Card



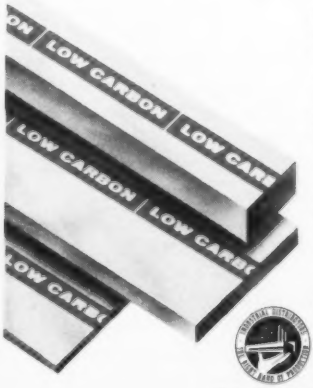
There's no mistaking

SIMONDS

LOW CARBON Flat Ground Steel

LOW CARBON LOW CARBON LOW CARBON LOW

← with this NEW Full-Length Labeling →



There's no confusion with other types of steel, when you use Simonds Low Carbon Flat Ground Steel. For this new product is readily identified by the full-length, peel-off tape. What's more, this modern labeling does not mar the bar . . . does not interfere with scribing . . . leaves no trace when removed.

This new low-cost steel completes the Simonds line . . . OIL and AIR Hardening Die Steels, and now LOW CARBON Flat Ground Steel as well. All three types are made to the same close tolerances, with the same extra smooth surface finish and good machinability.

Simonds Low Carbon Steel comes in flats from 1/16" to 1 1/4" thick, and 1/2" to 16" wide; also in squares from 3/8" to 2 7/8". All stock sizes come in standard, ready-to-use 24" lengths, individually packaged. Special sizes on order. Call your Simonds Distributor *now*.

For Fast Service from Complete Stocks Call your **SIMONDS Industrial Supply DISTRIBUTOR**

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

For more data circle 402 on Postpaid Card

OVER THE EDITOR'S DESK . . .



THE DO-IT-YOURSELF CURSE

Too often for the sake of expediency in the home as well as in the shop today it is considered the right and smart thing to design it yourself, build it yourself or repair it yourself. Within certain limits the idea works beautifully but, as a great many people are beginning to find out, the idea of "do it yourself" should and must be used with the utmost discretion.

Too often the simple plumbing repair at home becomes the major sink, tub or washstand replacement, the "easy-to-lay" floor covering turns out crooked, the acoustical ceiling uneven, the cement walk rough, and the flagstone terrace an impossible mess. In the shop, a do-it-yourself approach to a problem can be often just as time consuming, wasteful and just as foolhardy. These are but a few of the reasons why we are prompted to pass along to you good readers a bit of excellent advice that has been suggested by a certain manufacturer of gaging equipment.

"Assurance of maximum control over Quality and Cost is effectively accomplished:

1. When the Gagemaker is entrusted with, and is completely responsible for, the Design, Build, Calibration, Installation, Service and Repair of the gaging equipment;
2. When the User specifies spares and replacement or worn tooling made by the original successful Gagemaker; and
3. When the responsibility for continued performance of the gaging function is solely and squarely shouldered by the Gagemaker.

These are important considerations to be used in evaluating the shop performance of gaging equipment; otherwise it is difficult to know who should be held responsible for final performance, the instrument maker? the outside designer? or the toolmaker?

Therefore to safeguard your Quality and Costs, consider a gagemaker qualified by long experience to design — build — calibrate — install —service—repair, and thus unqualifiedly assign and centralize complete responsibility for shop performance in one source.

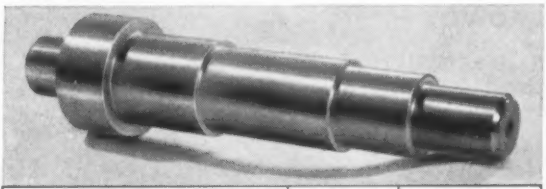
Since the cost of gaging cannot be measured solely or simply by the initial investment, it will pay the purchaser to carefully consider all factors before deciding the course of action which is to be taken."

Production time reduced 82% on new lathe

PROFIT POINT ... TURNING

New Barber-Colman 36-speed lathe does 13 operations on drive gear and shaft in 22.7 minutes

Turning time on the drive gear and shaft shown in the illustration was reduced from 126 minutes to 22.7 minutes when transferred from an old lathe to a new Barber-Colman 36-speed lathe.



STANDARD TIME	OLD LATHE	NEW 36-SPEED LATHE
SETUP TIME (hours)	1.09	1.75
SPEEDS (rpm) FEED (inches per rev.)	350 .015	644 to 912 .013
PRODUCTION (per hour)	0.47	2.64

The shaft is 15" in length with a maximum diameter of 3.744". Spindle speeds range from 644 rpm to 912 rpm, and the feed is .013" per revolution. On the old lathe, speed was 350 rpm and the feed was .015" per revolution. This is a good example of how machine horsepower, accuracy, rigidity, and operational features can reduce costs drastically.

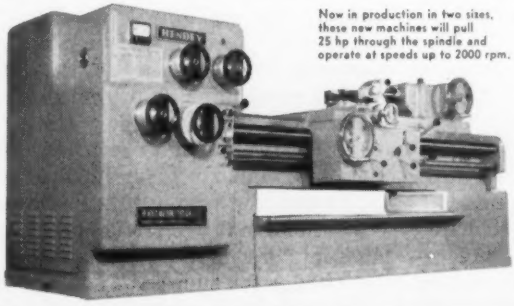
Easy-to-set up Barber-Colman lathes combine power and precision for profitable optimum speed turning with negative-rake throwaway insert tools. They're heavier and wider through the carriage than most lathes of their size. Controls are "human engineered" to make a busy operator's job easier and more efficient. Yet they offer every toolroom feature you can name, plus guaranteed accuracy for precision work.

Opportunities in cost-cutting modernization

There'll never be a better time to buy a new lathe, or greater opportunities to reduce costs through equipment modernization. Here are two good reasons:

1. *Throwaway insert tools* are the biggest "break-through" in lathe "economics" in 30 years. Think of what it costs you to sharpen, change, and reset conventional tooling! Throwaway inserts make your perishable tool costs so low in relation to part costs and the cost of operating a machine, the only sensible thing to do is boost speeds, burn up tools faster, and reduce floor-to-floor time.

2. *It's the right time to buy machine tools,* because you can "pick and choose" — get the right machine and tooling for your assortment of jobs. The increase in productivity will prepare your plant for periods of high volume, spiraling costs, and labor shortages tomorrow.



Now in production in two sizes, these new machines will pull 25 hp through the spindle and operate at speeds up to 2000 rpm.

Barber-Colman Company
104 Loomis, Rockford, Illinois

Don't expect a day's work for a day's pay on yesterday's machine tools.

BARBER COLMAN

PRECISION LATHES

For more data circle 403 on Postpaid Card



GROWTH

In a recent Rockefeller Report entitled "A Dissent," the following thought-provoking statements appear: ". . . we have confidence that the American economy will shake off the present lethargy and again advance. How fast it 'should' advance—by 2 percent, 3 percent, or 4 per cent per year—we frankly do not know, and doubt that anyone else does, least of all government officials and statisticians. Statistical projections have their dangers. For when men come to believe that they know how much the economy should grow this year and next, how its various sectors must be expanded and contracted, and how our patrimony must be divided, it is only a short step to enlisting the government to bring these calculations about. What begins as a statistical exercise becomes an instrument of manipulation and socialization, perhaps more dangerous, because more subtle, than Marx's ideas about the revolution of the proletariat and the seizure of the means of production."

★ modern machine shop ★

DR. BENSON SPEAKS

As Director, National Education Program, Dr. George S. Benson offers the following message, based upon a considerable amount of experience in the field of education. What he has to say applies to education in all of its ramifications, including training programs which might conceivably involve business and industry.

"There is another drive on, pushed by a few self-delegated Congressional and professional 'spokesmen for education,' seeking to have the Federal Government spend billions in tax money for college scholarships. As a college president and as one who travels the length and breadth of the nation talking to educators and looking into the school situation, I believe it to be a needless, a costly, a wasteful, in fact a harmful and dangerous project.

"Most of the private colleges of America—which educate about half of the nation's graduate crop each year; and whence come a high percentage of the leadership in all walks of American life — are struggling with financial problems. But scholarship money is the least of these. It would not be much of an exaggeration to say that any scholarly high school graduate in America today can go to college—if there is a genuine desire for further educational attainment. Private industry, research institutes, foundations, and the colleges themselves (from special scholarship funds) provide scholarship assistance.

"And a significant percentage of students in private colleges today who have genuine ability and desire but not enough funds help themselves by 'working their way' to augment available scholarship money, or to pay the whole bill. There are exceptions but generally speaking, students in this category have a better chance for success. They are developing resourcefulness, a sense of



Why Grandmother!

Stories on grinding wheel problems—just like the kind you tell the youngsters—can have a happy ending. And we're writing new ones day after day for plants where high grinding wheel costs and low production have been wolfing up profits.

If *you* are ready to "cry wolf," let us send CINCINNATI (PD)° WHEELS to the rescue. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that can *save you money—and increase your production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So, if grinding problems have you ready to shout for help, just contact your CINCINNATI Grinding Wheel distributor. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone—Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U.S. Pat. Off.

For more data circle 404 on Postpaid Card



responsibility, initiative and personal industry, all of asset value to themselves and to our nation.

"For the exceptional students who haven't the opportunity to 'work their way' and are short of cash there are available or could be made available out of private funds sufficient scholarships. If the Federal Government wants to do something constructive to aid the quality and quantity of each year's college graduating class, let it offer additional incentives, in lower taxes, in tax exemptions, and so on, to the present private sources giving money to colleges to improve the quality of teaching and help meet the mounting overhead and expansion needs.

"The Federally-financed scholarship idea is one which exploded out of the Sputnik excitement of a year ago. Educators throughout the nation didn't conceive the idea. It was hatched in Washington, and it rose out of the clamor which suddenly upgraded Soviet-type science education and downgraded our own. It originated with people who seem to think that tax money — preferably Federal Government tax money — can solve all problems, cure all ills. It is my contention that recourse to Federal Government tax money in areas such as college scholarships, teacher salaries or school building construction creates new problems, causes many new ailments.

"When new tax-eating projects are created, either the already heavily burdened taxpayers must dig up and pay in to the Federal treasury additional taxes, or the Federal treasury must add to our already staggering Federal Government debt which now approaches and will likely soon exceed $300 billion—hanging like a heavy chain across the shoulders of coming generations of citizens. When the Federal Government gets a financing hand in any activity at the grass roots it can exert dictatorial pressures, and in education that is dangerous."

★ modern machine shop ★

GREATER EFFORT

According to a report recently issued by the American Machine Tool Distributors' Association, the past year has witnessed distributors increasing their sales forces, despite the level of the industry's business in the past year. A nationwide survey disclosed that 84 percent of the distributors have the same or more sales engineers today than in 1957. Commenting on the survey, AMTDA President Frank H. Habicht, states, "It reflects a demonstrated growth in distributors, and their confidence in the future of the machine tool industry. With new business for the first six months of 1958 at less than 50 percent of the same 1957 period, we must invest more time and money in sales effort—to build for the future."

Distributors are also using better management methods to reduce administrative personnel requirements. In June of 1957 it took, on the average, six inside people to serve eight sales engineers. Today, those six people serve nine sales engineers.

Fine tools that encourage Good Work



ARMSTRONG WRENCHES

If you don't know your local ARMSTRONG Distributor, we will send you the names of those in your area.

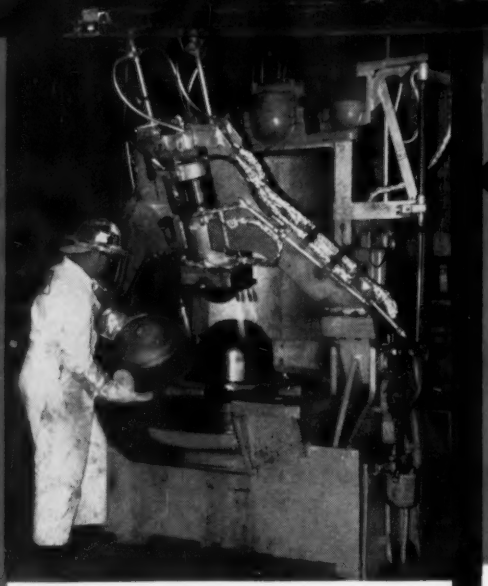
An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types —single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

ARMSTRONG BROS. TOOL CO. 5228 W. ARMSTRONG AVE. • CHICAGO 46, U.S.A.



For more data circle 405 on Postpaid Card

Automatic Spinning of Titanium



A detailed discussion of the machines and processes employed in making hot spun titanium hemispheres.

By GILBERT C. CLOSE
Field Editor, Modern Machine Shop

Few job shop operators, just opening for business, would deliberately choose the roughest pathway toward success. But about three years ago, with the ink on its newly printed letter heads still damp, officials of Titanium Fabricators, Inc., Burbank, California, made such a choice.

Paul T. Wilson, Vice-President and Chief Engineer, explains it this way . . . "We were interested in titanium and, because of its peculiar metallurgical properties, knew it had a brilliant and expanding future. We knew also that because of the difficulty of working this mate-

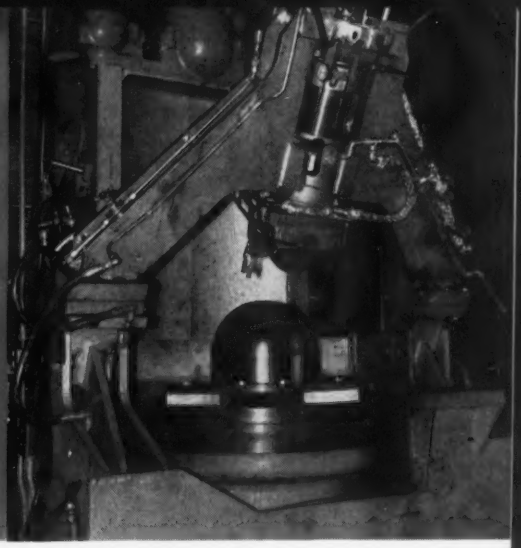


Fig. 1—Automatic spinning machine in operation. Gas torches heat both the blank and die during spinning. Yoke and ram travel and pressure are provided by a 3,000 p.s.i. hydraulic system. Machine may be manually controlled or set for automatic operation.

Fig. 2—Close-up of machine table (with spinning die), yoke, ram and spinning roll.

rial, and the lack of general knowledge concerning it, that we'd have a minimum of competition in the job shop field. We merely coupled this knowledge with a firm conviction that we could solve many of the baffling production problems and then rolled up our sleeves!"

Today, just three years after the opening, Titanium Fabricators, Inc., is generally known as a specialist in titanium fabrication. They have worked out and perfected techniques for machining, drilling, tapping, forming, heat treating, and welding titanium which are widely regarded as among the most advanced techniques in the field. Most of the equipment in use was company-designed and built or company-modified to cope with the temperamental qualities of the titanium alloys. Much of this equipment has been automated to a degree compatible with these same temperamental metallurgical qualities.

An outstanding accomplishment in the shop is the company-designed and built machine used to automatically hot spin titanium hemispheres, and the associated company-developed equipment used to heat treat these hemispheres and then automatically weld them together into the finished product. In developing these machines and perfecting the associated processes, engineers at Titanium Fabricators met with and overcame most of the major problems associated with the forming, heat treatment, and welding of titanium. A detailed discussion of these machines and processes will be relevant to the interest of anyone now working with, or planning to work with, the titanium alloys.

It is generally known that the spherical shape has many applications in industry, and especially in the new missile and rocket fields. It is used in the fabrication of pressure vessels and bottles, in heat exchangers, for shields, and for rounded ends on elongated containers of all types. The spherical shape has

". . . minimized material requirements coupled with high strength-weight ratio makes these alloys ideal for spherical products."

the greatest possible internal volume for the amount of space occupied by a container, and structurally provides the greatest strength with the least amount of material. And where weight and space are at a premium, the minimized material requirements coupled with the high strength-weight ratio of the titanium alloys makes these alloys ideal for this sort of spherical product. Material saved versus the high cost of titanium is also a very important factor.

The automatic hot spinning machine (Fig. 1) for producing these hemispherically-shaped sphere components, and now in production use at Titanium Fabricators, was literally shop-built from the ground up. A vertical boring mill was used as the starting point. The machine was stripped of its boring mechanisms, including spindle, ways, spindle drive unit, and so on, leaving only the table with its variable drive unit intact. This table provides spinning speeds from 0 to 1,150 r.p.m., and was modified to mount a variety of hemispherically-shaped steel spinning chucks or dies ranging upward of 20 inches in radius.



Fig. 3—Machining exterior of titanium hemisphere on modified turning lathe. Hemisphere is chucked and rotated while toolholder travels in arc parallel to arc of hemisphere.

A large yoke as shown in Fig. 2, was then installed with its hinge axis in line with the axis of the table-mounted hemispherically-shaped spinning die. Thus, the top center of the yoke remains an exact distance from the die surface as the yoke is hinged downward from a vertical to a horizontal position. Next, a hydraulic ram was installed in the exact top center of the yoke with its horizontal axis vertical to the yoke's arc of travel. The spinning roll, which makes contact with and forms the titanium blank around the die, is mounted at the inner end of this ram. During spinning of a titanium hemisphere, both the action of the yoke and the spinning pressure on the ram are provided by a 3,000 p.s.i. hydraulic system. Quick-acting valves in this hydraulic system permit almost instantaneous conversion from auto-

"Machining of interior and exterior surfaces of hemispheres is accomplished on a pair of modified turning lathes."

matic to manual control, a machine feature installed to readily compensate for the already mentioned temperamental qualities of the titanium alloys.

Four water-cooled Victor gas torches are used in any combination required to attain correct spinning temperatures, which vary from 1,100 to 1,600 degrees F., dependent upon the titanium alloy that is being spun or peculiar deviations of a specific alloy.

It should be pointed out here that this same machine is used also for spinning steel parts, and that it can be used to spin conical as well as hemispherically shaped parts. A company-designed hydraulic tracer was added to the machine to control the hydraulic ram (and thus the position of the spinning roll) during spinning of the conical shapes.

While describing the automatic hot spinning machine, John Eversole, Shop Superintendent, pointed out that a titanium hemisphere can be spun in about one-fourth the time required by other techniques now in use, and that up to one-half less material is required for the original blank than by other processes like deep drawing or forging. In fact, the material is blanked just one inch beyond its final boundries. Thus, trim waste is negligible during final sizing of the hemisphere on a lathe.

The spinning techniques now employed with the new automatic spinning tool were developed by Dr. Morey Asimow and Fred Spiegl, Executive Vice President of Titanium Fabricators. Most of these techniques were entirely experimental to begin with. "We had no case histories to turn to," Eversole said, "so we had to develop each technique as an integrated part of our total spinning process. In some cases, this required a lot of trial-and-error work, along with a lot of common sense. The variations between the different titanium alloys, and the variability of a specific alloy itself, introduced further complications."

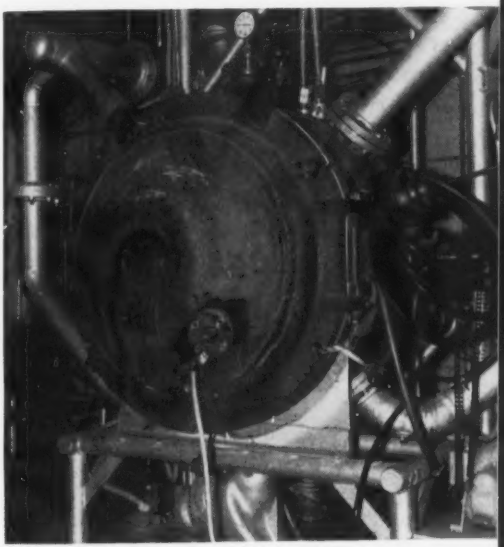


Fig. 4—Company-built titanium heat treating furnace designed for titanium hemispheres. This furnace is electrically heated and employs an argon-helium atmosphere.

"The spinning techniques employed are effective enough so that rejects and waste fall within predictable scrap allowance . . ."

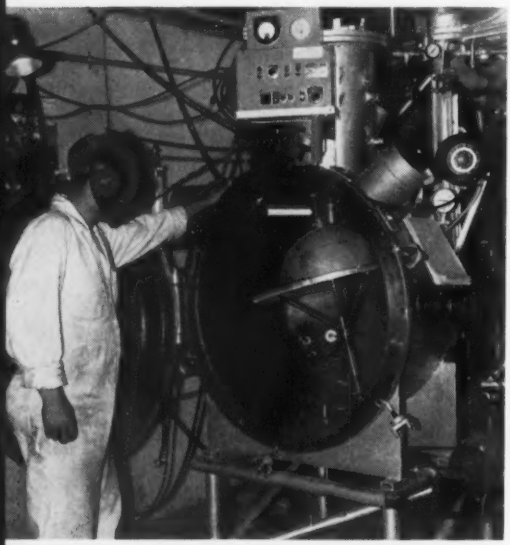


Fig. 5—Automatic welding furnace in which hemispheres are mounted for welding together or for welding in plug-plate (as shown here). Articulating torches are employed. An argon-helium furnace atmosphere is used.

The spinning techniques employed today are effective enough so that rejects and waste fall within a predictable scrap allowance thanks to the effectiveness of the equipment developed at Titanium Fabricators for handling different stages of the process.

In preparing to spin a titanium hemisphere, the metal is first blanked to a radius one inch in excess of finished requirements. This blank is then center-dimpled on a company-developed dimpling machine fitted with a dimpling die with a radius corresponding to the radius of the spinning die which will be used on the part. The blank is held in the dimpling machine by a special forged bolt through a center hole which holds it firmly against the dimpling die. The same bolt hole is used to mount and hold the blank on the spinning die, thus assuring exact re-location when it is re-mounted in the spinning machine.

After mounting for spinning, a spinning lubricant is hand-brushed on the blank. Next, the torches are lighted and both the blank and die are brought to proper spinning temperature. When this temperature has been reached, the yoke is actuated from a vertical position downward over the blank, while the spinning roll effectively works the titanium against the die. The total heating cycle (from the time the torches are lighted until they are shut off) ranges from 5 to 12 minutes, depending upon the size of the hemisphere being spun and the thickness of the metal in the blank. Ram pressure against the spinning roll is from 6 to 12 tons, depending upon the thickness of the metal being spun. While manual control of the spinning cycle is often exercised during the initial production of a part, once a few parts have been spun the machine can be set for automatic operation.

One of the first operations after spinning is removal of the contaminated surface of the spun titanium part. Various techniques

". . . same machine can be used to spin conical as well as hemispherically shaped parts."

are used, depending upon the alloy involved. Some alloys are pickled; others are sent out for vapor blasting, sandblasting, peening, or chemical etch. This is followed by a surface machining operation to assure complete removal of the contaminants and to true up the hemisphere for final welding together.

Machining of the interior and exterior surfaces of the hemispheres is accomplished on a pair of modified turning lathes. The hemisphere itself is chucked and rotated, while the tool carrier actuates in an arc parallel to the arc of the hemisphere. The lathe for machining the exterior of the hemispheres is shown in Fig. 3.

After surface cleaning and surface machining, the hemispheres are ready to be heat treated and welded together. Here again definite procedures, depending upon the alloy, had to be worked out. Some alloys are heat treated before welding, others after welding. Heat treating is accomplished in a small atmosphere-controlled furnace, as shown in Fig. 4. A combination argon-helium atmosphere is used in the furnace. Heat treat temperatures vary between 1,000 and 1,700 degrees F., depending upon the alloy.

The equipment used and techniques employed to weld the hemispheres together were also company-developed. The spheres are welded both internally and externally. Welding is accomplished in an argon-helium atmosphere while the parts are mounted in the welding furnace shown in Fig. 5. Carefully adjusted articulating welding torches are used in the work.

The welding wire used in welding the exterior seam is fed into the welding furnace from a dust-free container which houses both the bulk welding wire roll and the feed mechanism, as shown in Fig. 6. This container is equipped with a transparent cover so that the operator can observe the feed operation at all times. This special attention to welding wire cleanliness is so that no contaminants will be carried in by the wire and fused in with the weld. The welding furnace

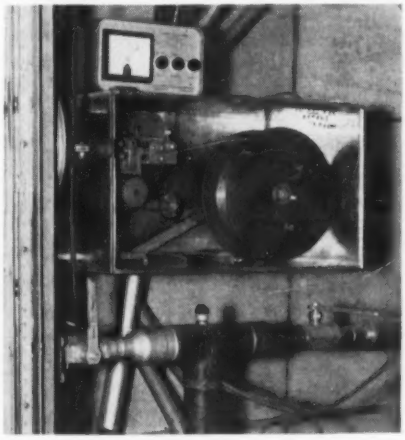


Fig. 6—Bulk welding wire and wire feed mechanism are contained in this dust-free box with transparent cover to avoid wire contamination. Strict cleanliness is necessary when working with various titanium alloys.

"Titanium alloys up to one-half inch in thickness have been spun to date . . ."



Fig. 7—The finished product—a titanium sphere ready for delivery. These spheres are used as pressure vessels in many types of missile design and are also employed in heat exchangers and for shipping containers.

itself is also equipped with a viewing port, and the interior is lighted during welding.

Aside from the straight-forward production of spun titanium hemispheres, it should be noted that variations in spinning may be accomplished with the equipment now in use. Conventionally, only one spinning pass is used, but the yoke on the spinning machine can be returned for additional passes if desired. By exercising a certain degree of manual control, it is possible to spin the metal thicker and thinner at different places on the same part —this despite the fact that shear spinning is looked upon askance by most titanium spinners because the yield strength of the metal is so nearly equal to its ultimate strength. This type of work requires the ultimate in control to avoid fracture and cracks.

Titanium alloys up to one-half inch in thickness have been spun to date, with no definite minimum thickness having been established. The main problems that have been encountered include the variability of the alloys, their susceptibility to surface contamination at high temperatures, and a high degree of notch sensibility. Close control of all operations and processes, including the time element, have been found to be the best countermeasures for these faults.

Engineers at Titanium Fabricators are not resting on their current accomplishments. Research is already being conducted on the possibilities of spinning complete titanium spheres as a single piece product. This would both speed the work and result in a more uniform product as the welding cycle would be eliminated. Just how these spheres will be chucked for spinning, and the development of a tool which will surface-machine the interior, is still a trade secret.

And success always has its humorous sidelights. Just recently Titanium Fabricators, Inc., was called upon to form and fabricate the

first pair of titanium horseshoes for a race horse. John Eversole is not certain whether or not the wearing of such shoes will influence the betting odds. But he is sure the titanium horseshoes will outwear the aluminum horseshoes they replaced.

★ modern machine shop ★

Super-Size Aluminum Ingot for Missile Improvement

Believed to be the largest of its type, the super-size aluminum ingot shown herewith was cast recently at Aluminum Company of America's Lafayette works. Weighing 24,000 pounds, the huge metallic cylinder measured 205 inches in length and 38½ inches in diameter. It was cast in alloy 2014. The record-size ingot was produced for Thiokol Chemical Corporation, one of the leading manufacturers of rocket engine propellants. It will be fabricated into a part intended to improve power and performance of missiles and rockets.



Huge aluminum ingot cast by Alcoa for subsequent fabrication into a part intended to improve missile and rocket performance.

★ modern machine shop ★

Automatic Process Control. By Donald P. Eckman. Published by John Wiley & Sons, 440 Fourth St., New York 16, New York. 368 pages. Price, $9.00.

This book treats the important principles of automatic control giving special emphasis to block diagrams and frequency techniques in process control. Beginning with process analysis and proceeding to the generalized behavior of closed-loop systems, the author covers such subjects as controller characteristics, measuring (feedback) elements, controlling and final control elements, process instrumentation, and sinusoidal analysis.

Systems problems are given a great deal of study and treatments are accorded to the various problems that are frequently encountered in process control in the practical situations one is confronted by in industry. Other special topics include: frequency methods; fluid and thermal process control; temperature control and application to steel processing. This material is augmented by nine detailed experiments one with an analog computer.

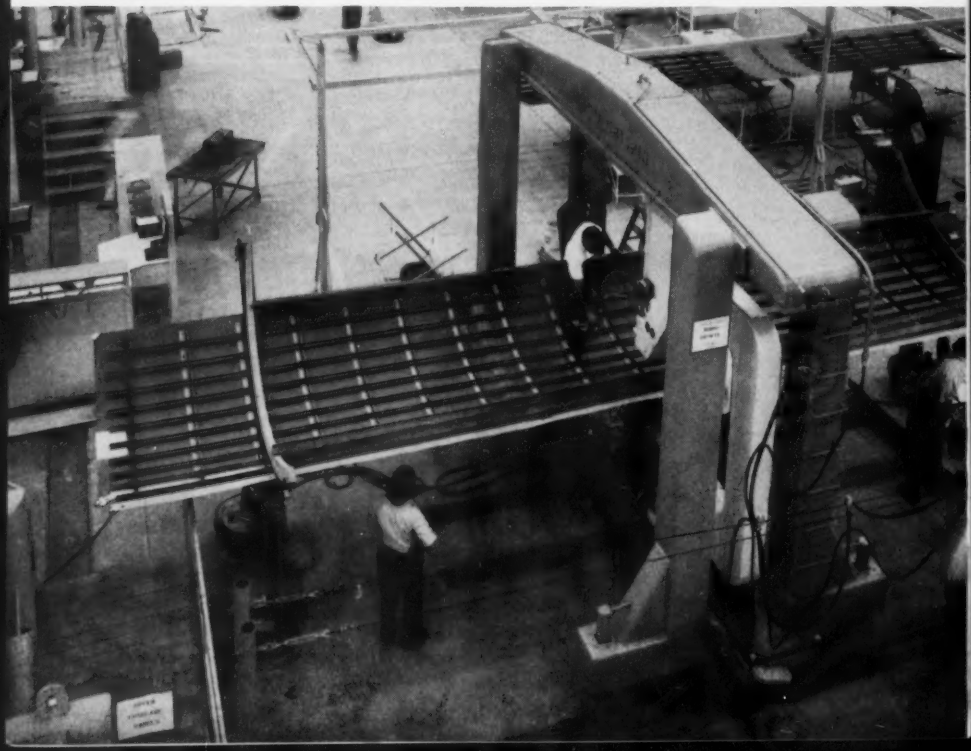
Riveting Is N

Semi-automatic riveter is used in scatter-pattern riveting of large fuselage panels for huge new DC-8 jet-propelled airliners.

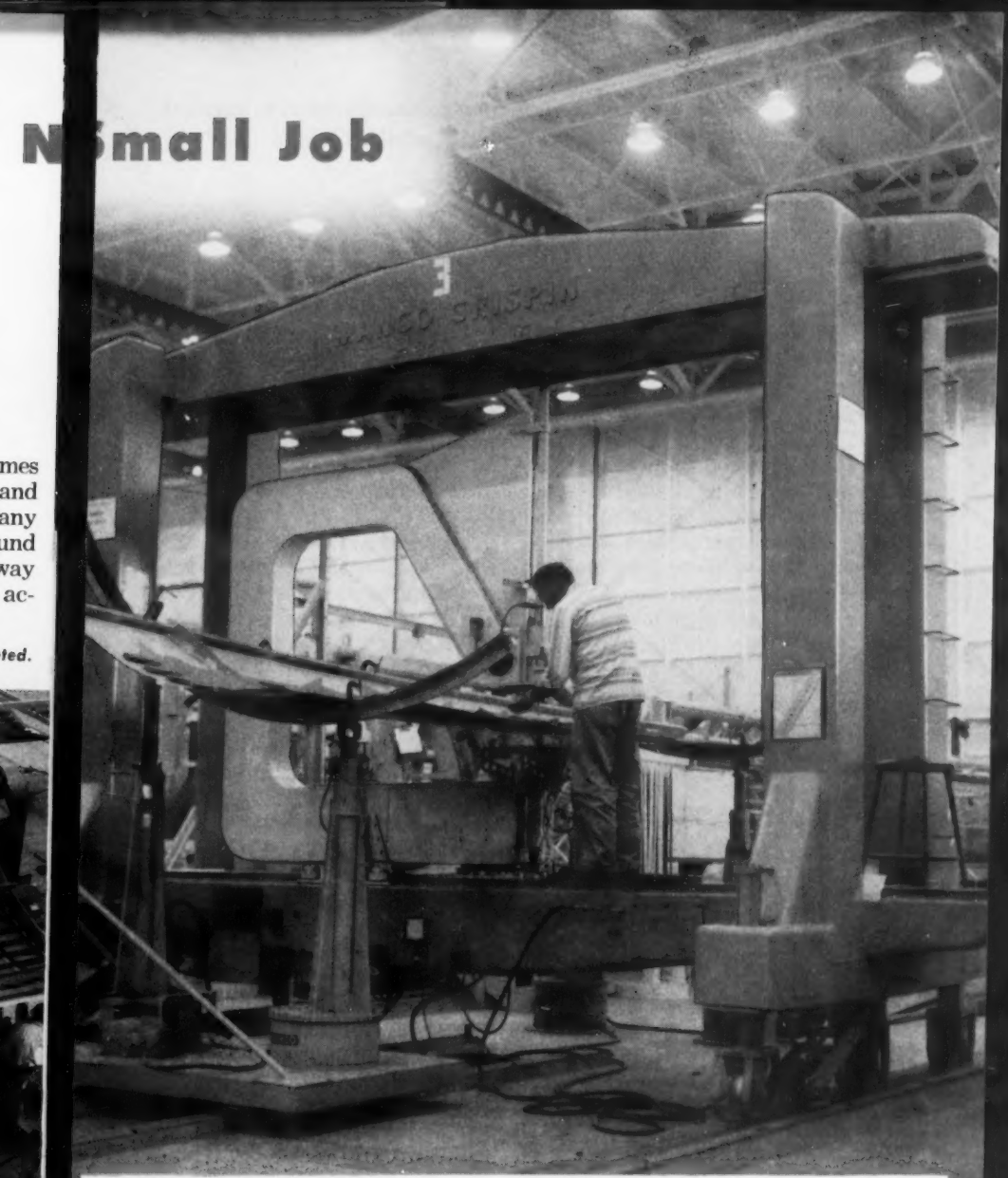
By BARTLETT WEST

Practical and successful production line automation depends largely on predictable, repetitive phenomena within the process or job being automated. When any phase of the process or job is unpredictable, automation becomes more difficult, more costly, and therefore less practical. In many cases in industry, it has been found expedient to "back track" away from full automation in order to ac-

View of Manco-Crispin riveter, showing large DC-8 jetliner fuselage panel being riveted.



N Small Job

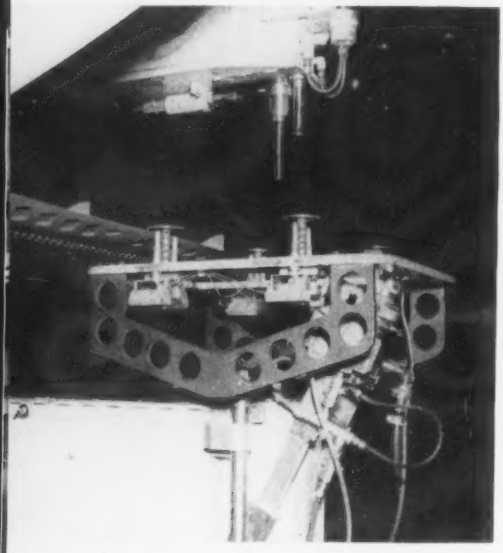


Oblique view of semi-automatic Manco-Crispin riveter showing adjustable-length but stationary work holder and rail-mounted gantry structure with its included automatic riveting yoke. Work holder does not move longitudinally after workpiece is installed, but gantry moves back and forth along rails, moving riveting yoke into riveting position.

". . . final positioning is accomplished manually with a vertical light beam which impinges upon the predrilled holes . . ."

complish certain types of work at a reasonable cost.

This happened in conjunction with automatic riveters in the aircraft industry. When Douglas Aircraft Company started production on the huge, new DC-8 jet-propelled airliners at its Long Beach, California facility, many of the large, prefabricated fuselage panels which go into this airplane required scatter-pattern riveting for completion. While from the technical standpoint it would be possible to program and install these scattered rivet patterns on a conventional type of automatic riveter, the job would be both cumbersome and costly, and could not be justified from an economic standpoint.



Close-up view of the riveting head and the sensing unit or ring while empty of work.

To overcome this problem, what might be called a "semi-automatic" riveter was conceived by T. S. Crispin, Tooling Administrator of the Santa Monica Division of Douglas. This machine, called the Manco-Crispin riveter, is now being manufactured under license by Manco Manufacturing Company, Bradley, Illinois.

This new riveter consists essentially of a stationary work holder spanned by a heavy-duty gantry which travels on rails laid parallel to the long dimension of the workpiece. The gantry in turn contains the riveting yoke for automatic rivet installation.

In riveting, the work is placed in the work holder mounted between the gantry rails, the gantry with its contained riveting yoke is triggered into the approximate riveting position by air motors, and then final positioning is accomplished manually with the aid of a vertical light beam which impinges upon the predrilled rivet holes in the work.

As yet the rivets must be manually inserted in the predrilled holes. After insertion of the rivet, the automatic riveting yoke is triggered into operation, an anvil descends against the top of the rivet while a pressure foot raises from beneath to exert a clamping force which squeezes the panels to be riveted together and upward against the head of the rivet. With the pres-

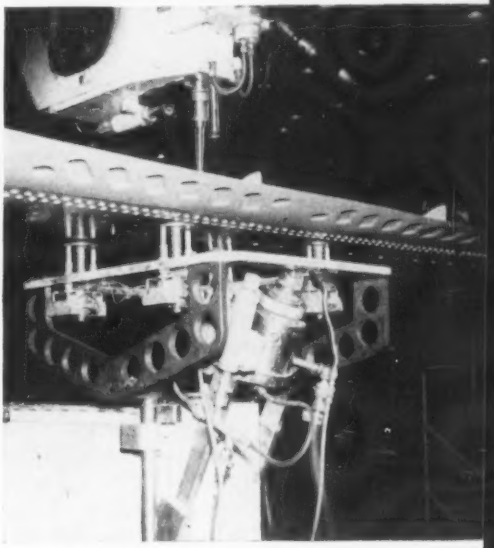
". . . leveling of the work is accomplished by four sensing units underneath the panel being riveted."

sure foot still exerting its clamping force, an automatic rivet gun upsets the rivet against the anvil and retracts. A shaving mechanism then moves into place and mills the upset portion of the rivet flush with the surface of the panel being riveted. As the shaver retracts, the pressure foot releases and the riveting yoke is hand-positioned to the next rivet location, where the cycle is repeated.

While the work holder itself is stationary, the frame of the work holder in which the work is mounted can be moved or tilted sufficiently to keep the area of rivet installation absolutely perpendicular to the riveting anvil. This leveling of the work is accomplished by four sensing units mounted on a sensing ring around the pressure foot of the rivet yoke and directly underneath the panel being riveted. The operator has only to touch a button and these sensing units move upward and contact the panel. If one of these sensing units touches the panel before any of the others, this triggers a mechanism which automatically levels the panel. This sensing unit for panel leveling is clearly shown in two of the illustrations accompanying this article.

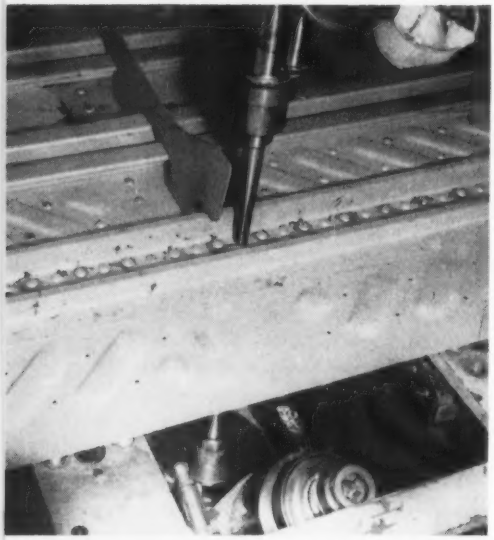
As pointed out by W. N. Morrison of the Long Beach Division Plant Engineering Department, the Manco-Crispin riveters at the Long Beach plant are not intended to compete with the fully automatic riveters. Their prime purpose is to accomplish jobs which cannot be accomplished economically on an automatic riveter.

Nevertheless, the Manco-Crispin riveters have inherent advantages which cannot be ignored. As the main structure of the work holder is a stationary installation, less floor space is required than is necessary when the entire work-holder installation shuttles back and forth. A second very important advantage is that no preprogramming is required to accomplish a job on the Manco-Crispin riveter. This is very important on many DC-8 jetliner fuselage panels which require



Here the sensing ring has been triggered upward against the nether side of the work.

". . . the only preparation of work prior to riveting will be a spray-template pattern of rivet locations."



Operator's eye-view of Manco-Crispin riveting work in progress. Rivet to be driven is centered directly under riveting anvil by manual control, but with the aid of a vertical light beam which assures accuracy.

different rivet patterns because of different interior fuselage arrangements required by different customers. Finally, in all airplants, and especially when a new model airplane is in production, engineering changes are frequent, and many of these changes affect work that is already in production. When such a change affects a rivet pattern for rivet installation in a workpiece, these changes may be readily accommodated by means of the Manco-Crispin riveter without the necessity of originating new rivet programs.

In fact, the Manco-Crispin riveter proved so advantageous in initial production work on the Douglas DC-8 jetliner that five of them are now in use. And as with so many new production types of machines, improvements of the Manco-Crispin riveter are currently being engineered.

One such improvement will increase the utility of the automatic riveting mechanism in the riveting yoke to a point where it will drill the rivet hole, countersink, insert the rivet, upset and then shave, all in a single cycle of operation. When this improvement becomes an accomplished fact, the only preparation of work prior to riveting will be a spray-template pattern of rivet locations.

Other improvements now being engineered include a more flexible floating-type work-holding frame within the work-holding structure, constructed in a manner to obtain a greater degree of rigidity to help keep the area of rivet installation absolutely perpendicular to the riveting yoke. This new work holder will incorporate a continuous leveling device which checks the particular panel being riveted for levelness between each rivet installation. It will not have to be triggered into operation by the operator.

While the overall time required to drive a rivet on the Manco-Crispin riveter exceeds that required by an automatic riveter, it is substan-

tially less than the time required to insert and drive a rivet by hand. When the pending improvements are incorporated, the overall time-per-rivet will be even shorter. Furthermore, the Manco-Crispin riveters can be used for installing rivets in those many locations on a pressurized airplane fuselage where hand-riveting is not practical because of the machine pressure which is required in order to force the panels tightly together during the riveting cycle.

From the long range point of view, the Manco-Crispin riveter seems to promise at least some degree of automation on "job riveting work" where preprogramming is, for obvious reasons, either not practical or economical.

★ modern machine shop ★

The Solid State For Engineers. By Maurice J. Sinnott. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 522 pages. Page size, 9 by 5¾ inches. Cloth binding, board covers. Price, $12.50.

This book was written to fill a vacuum. It is neither a textbook on engineering materials nor a text on solid state physics but was written to fill the gap between the two. This it does admirably. More specifically, this book deals with the features of solid materials that are of special interest to the engineer. The author sets forth a series of fundamental principles which provides an accurate and convenient reference to problems concerning the choice and use of materials.

In developing these principles, the author surveys the basic concepts of the various sciences which bear on the behavior of the solid state of materials. Each is discussed in the light of its contribution to the subject matter of the text. Each chapter of the book is a condensation of one such entire field of investigation.

Problems located throughout the body of the text serve to illustrate applications of the principles and demonstrate the practical value of the material presented.

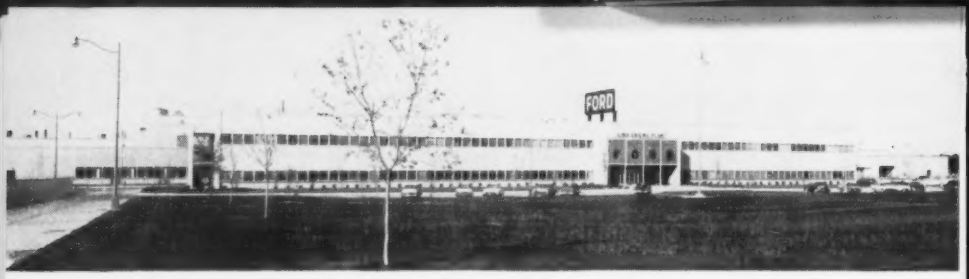
Bibliographies at the end of each chapter serve as convenient lists for further examination of each aspect of the subject.

This book is not meant for the casual reader. For the seriously interested engineer however, this is one of the best books in the field.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



"My advice to you, young man, is this . . . get rid of that fancy handle-bar mustache!"

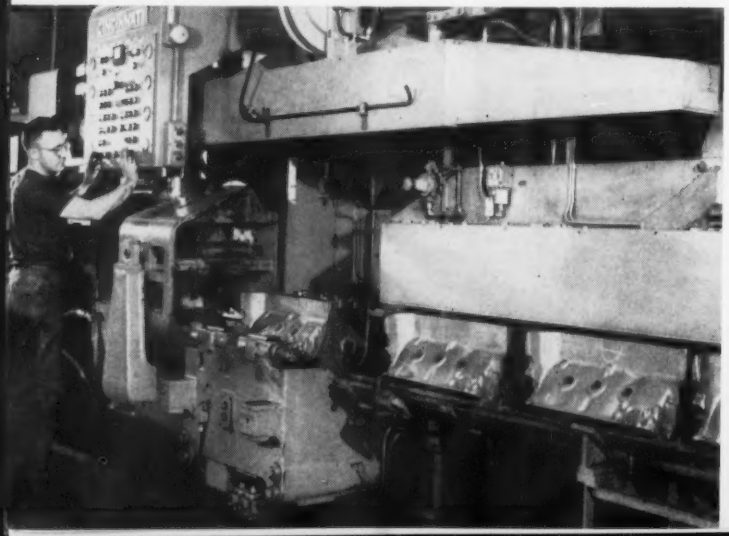


Maximum Automation Featured In Engine Plant

By FRED W. VOGEL
Editor, Modern Machine Shop

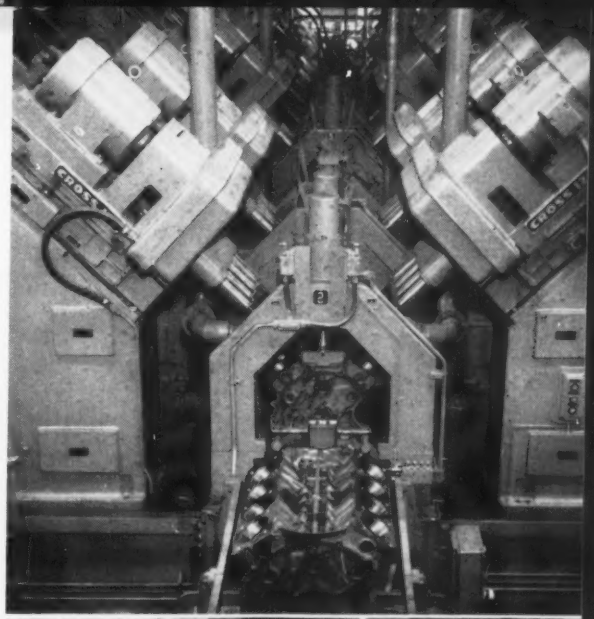
Few plants around the country, particularly in the field of automobile production, have more to offer in the way of an outstanding example of efficiently organized automated production operations than the Ford Motor Company's new engine plant, located in Lima, Ohio, which is now in production on engines for the 1959 model Mercury, Edsel, Lincoln, and Continental cars. In this new plant, which provides more than 1,000,000 square feet of floor space, every spot where automation could possibly be used was subjected to the most thorough analysis. The result is a plant designed for the production of 4,000 engines daily on a two-shift basis.

The Lima Engine Plant is a key project in the expansion, modernization, and tooling program for which the Ford Motor Company has spent more than four billion dollars since the end of World War II. Actually it is the fourth Ford



Initial machining operations on engine blocks are performed by this giant Cincinnati broach. The block moves into the broach where it is automatically clamped into place and the top and bottom parts machined. At the end of the operation, the block is automatically unclamped and moved to the next machine.

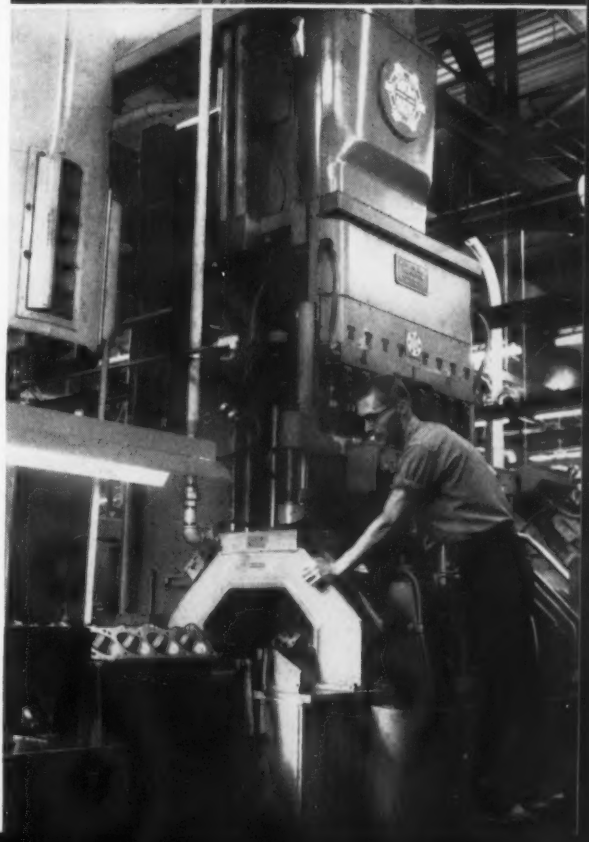
The line of drill presses shown here automatically drill and ream valve holes in engine blocks. The blocks pass through 16 different operations as they are moved down the 50-foot long machine. Dust collecting tubes in the center remove all cast iron dust from the area.



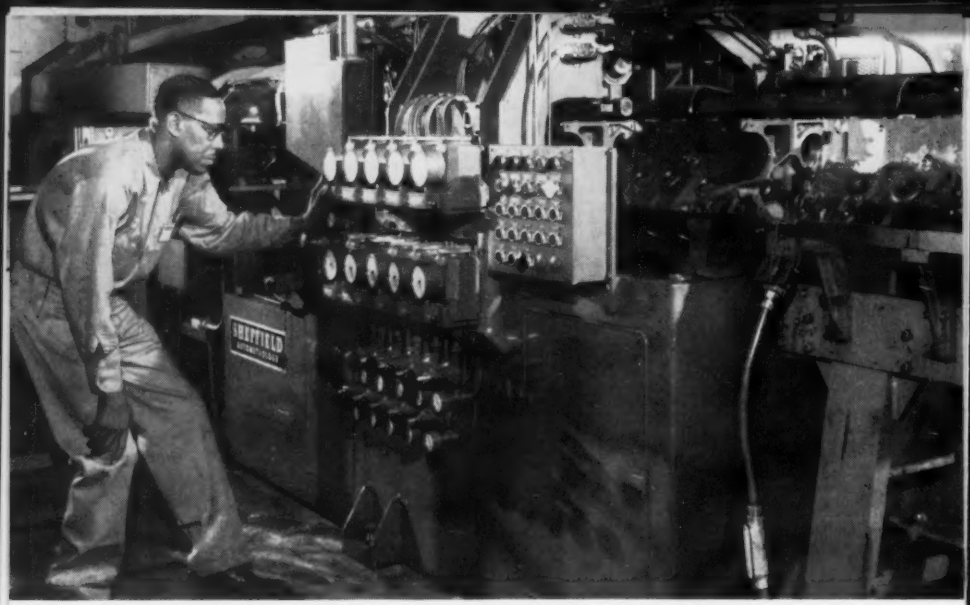
facility to use the technique of automation in producing automobile engines. The company's Cleveland Engine Plant No. 1 pioneered the use of automation seven years ago and was followed in 1953 by a completely renovated Dearborn, Michigan engine plant. Cleveland Engine Plant No. 2 began production in 1955.

One of the outstanding features of the new engine plant, developed as a result of constant study of automation, is an excellent in-process quality control program. A method of checking engine blocks and component parts during machining processes has been developed to the highest degree in the entire automobile industry.

On this and the next few pages appear illustrations which show a few of the more important operations performed at the Lima plant.

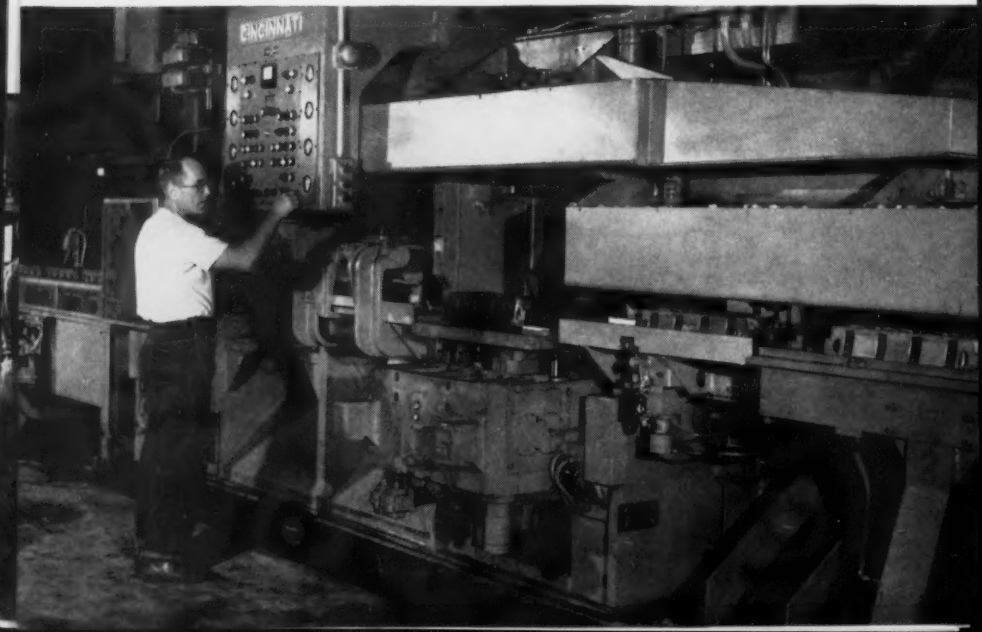


Micromatic honing machines give engine block cylinder bores the highly finished surface required for precision assembly. The eight-cylinder blocks are tilted slightly so that the machine may hone the cylinder bores in a vertical motion. The block then is transferred to the next station and the tilting action reversed so the second bank of cylinder bores also is honed vertically.

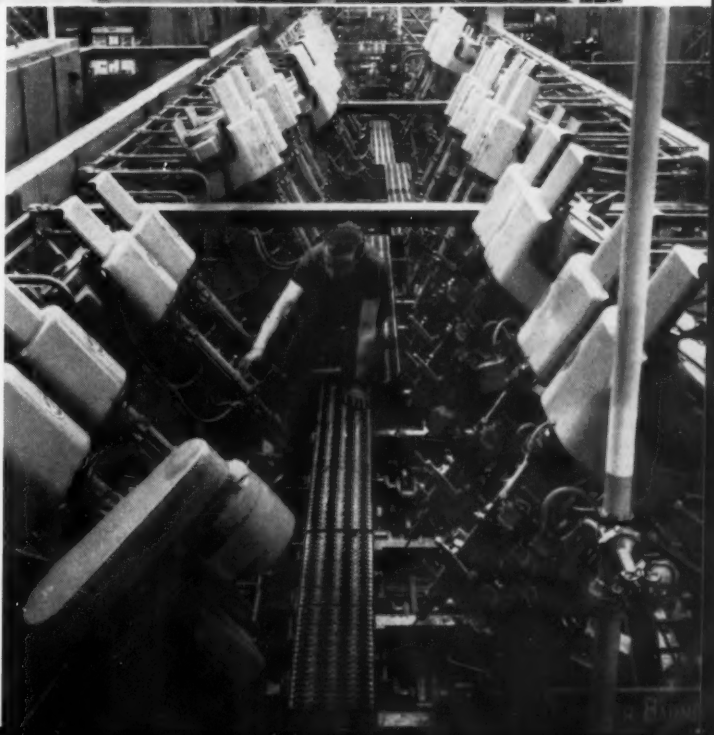


(Above) One of the highlights at the new plant is the extensive use of quality control gages to check parts during machining processes. This completely automatic gage checks various diameters in the engine block and rejects blocks that fail to meet engineering specifications. Use of the in-process gages has led to greater quality in engines produced.

(Below) Engine cylinder head begins journey down a long machining line at this initial Cincinnati broach. Machining along the cylinder head line features extensive use of automated equipment highlighted by the gun drilling operations and reaming operations.

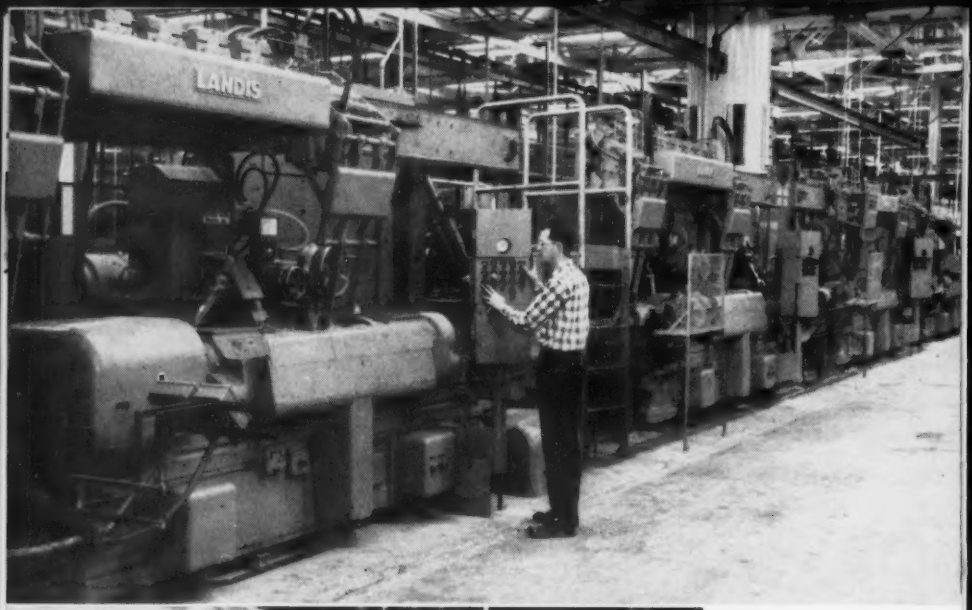






(Above) This automatic machining line drills, mills and reams engine cylinder heads. The machine performs 63 different operations as the head automatically moves down the length of the machine. The exhaust fan in the foreground is part of the air conditioning system which keeps air fume and dust-free throughout the plant.

(Right) High quality production is possible with special purpose, 52-foot long, transfer type machine tools such as this which automatically drills entire oil system in an automobile crankshaft in one continuous operation.

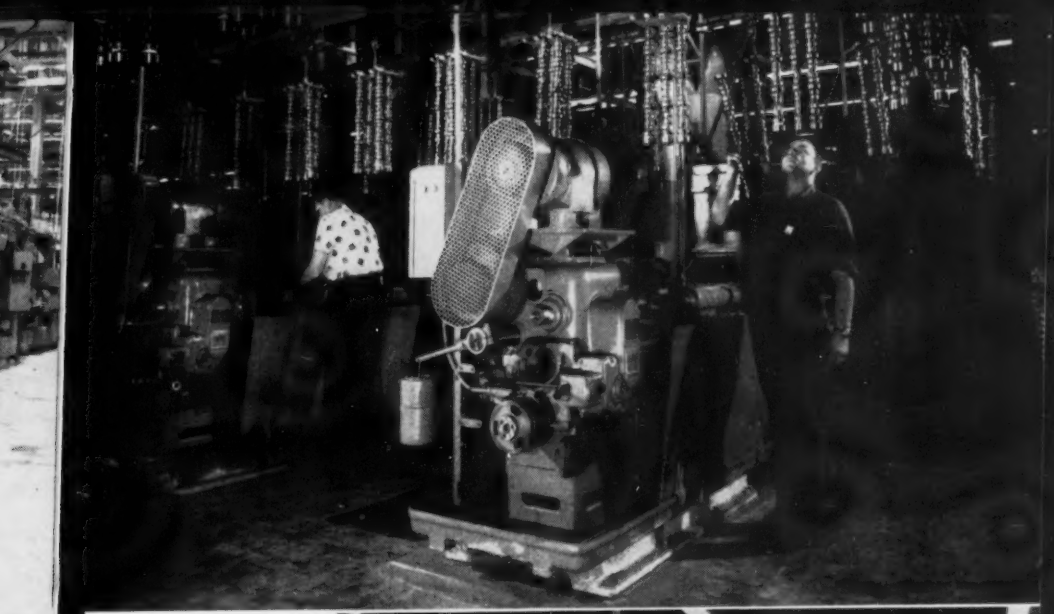




(Above) This transfer-type crankshaft pin grinding machine is capable of machining 40 automobile crankshafts per hour. A crankshaft enters the first machine and automatically is cycled through three succeeding operations for grinding 4 crankshaft pin journals.

◆

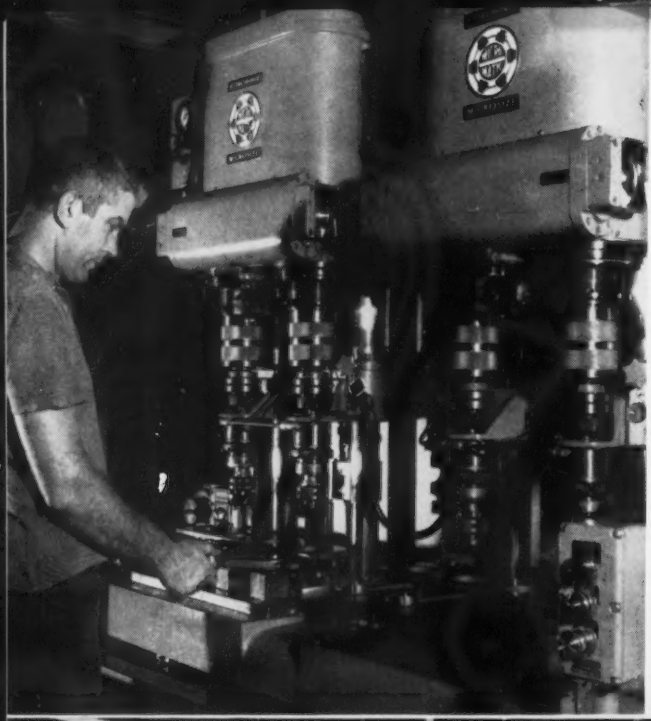
(Left) 32 critical dimensions of an engine crankshaft are gaged simultaneously and automatically on this air-operated visual gage. Although the crankshafts are checked at practically every machining operation, they receive a final dimensional check while rotated on this gage.



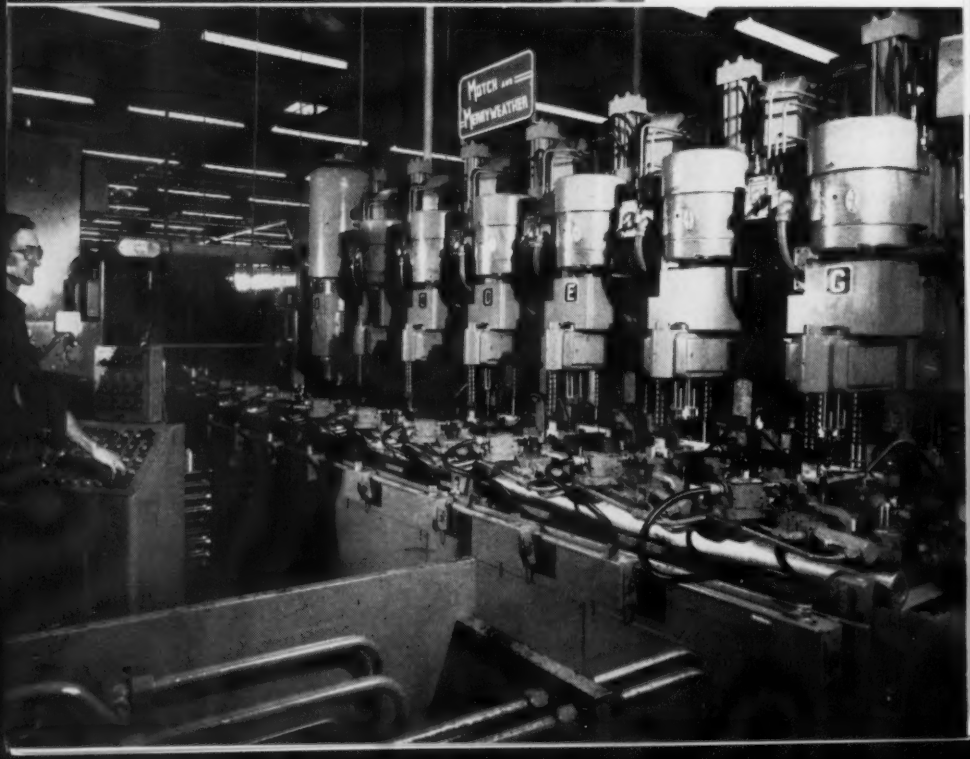
(Above) Overhead monorail conveyor system carries automobile camshafts to and through all machining operations. Approximately 3,500 camshafts can be carried on the system at one time. Lathes in the foreground are used for rough turning the main bearings of the camshafts.



(Right) Eight connecting rods are loaded at one time in this automatic transfer-type machine which is approximately 100 feet long. Simultaneous machining of the rods insures an exact cut on all rods going into the same engine and advances selective fitting procedures.



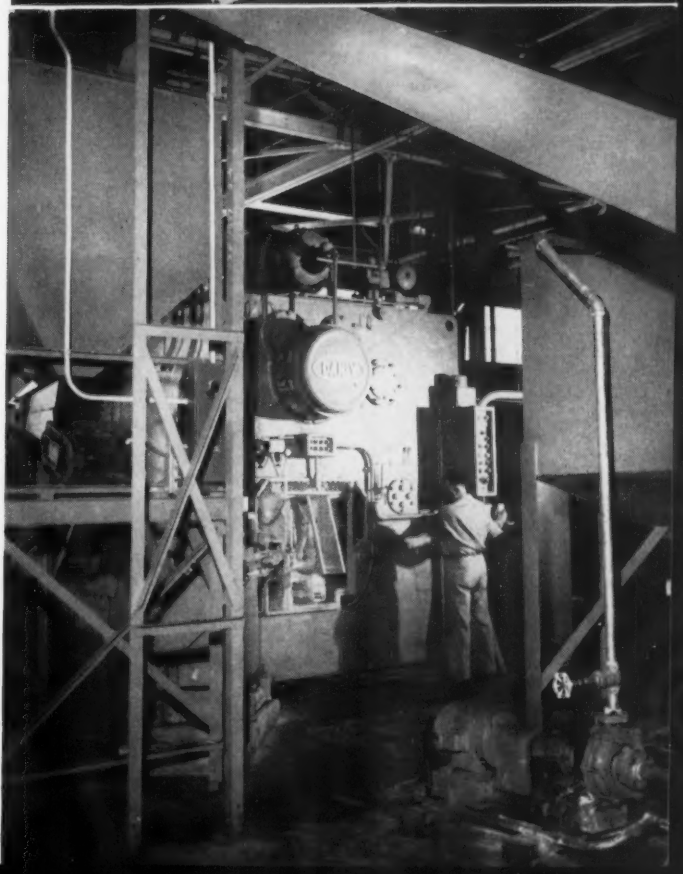
(Left) This Micromatic honing machine permits precision machining of crank end of connecting rod. The new plant features four machines for honing the crank end of the rod and four for pin end honing. Each machine is capable of honing four connecting rods simultaneously and turning out approximately 450 rods per hour.



(Below) Seven different drilling, milling and reaming operations are done on engine pistons as they pass through this completely automatic machine. Capable of machining 600 pistons hourly, this transfer-type machine is one of many in the piston department.



This Flamatic operation is used to harden the gear which is located on an engine camshaft sprocket. As the gear is revolved, the flame jets heat the teeth to the desired hardening temperature. The part then is automatically ejected into an oil bath where it is quickly quenched.



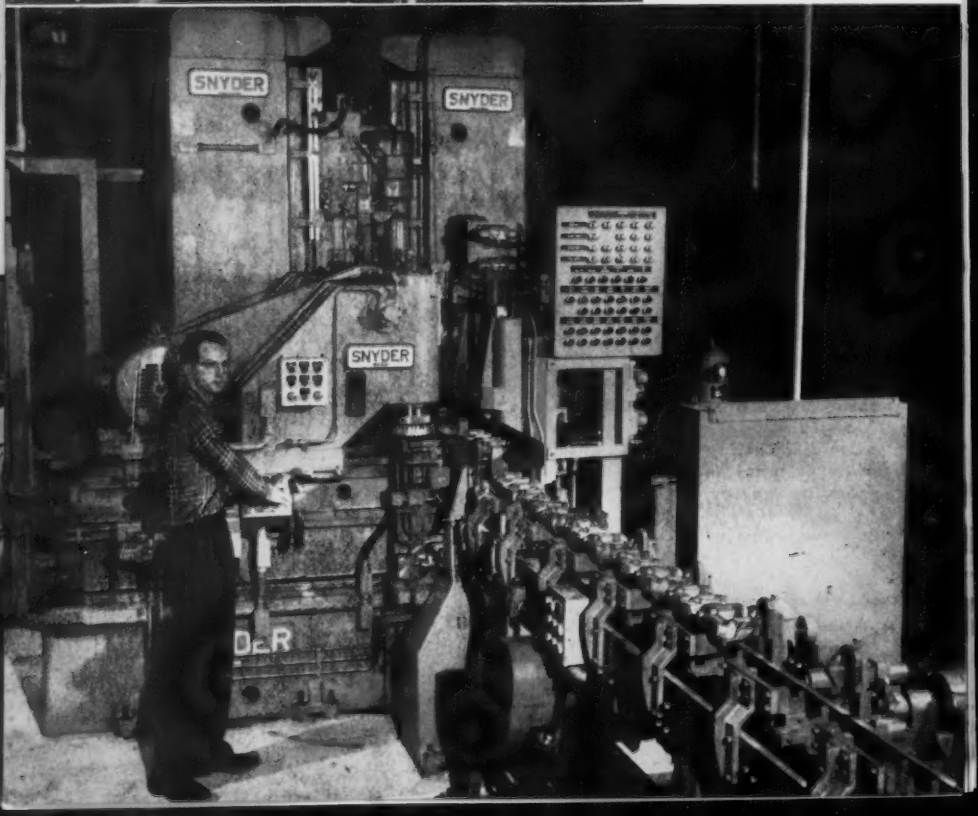
Small steel slugs are quickly converted into automobile piston pins by this giant Danly press. One of the newest production processes in the automotive industry, cold extrusion of piston pins has been developed to its highest degree at the new plant. One press is claimed to be capable of producing over 1,900 piston pins hourly.



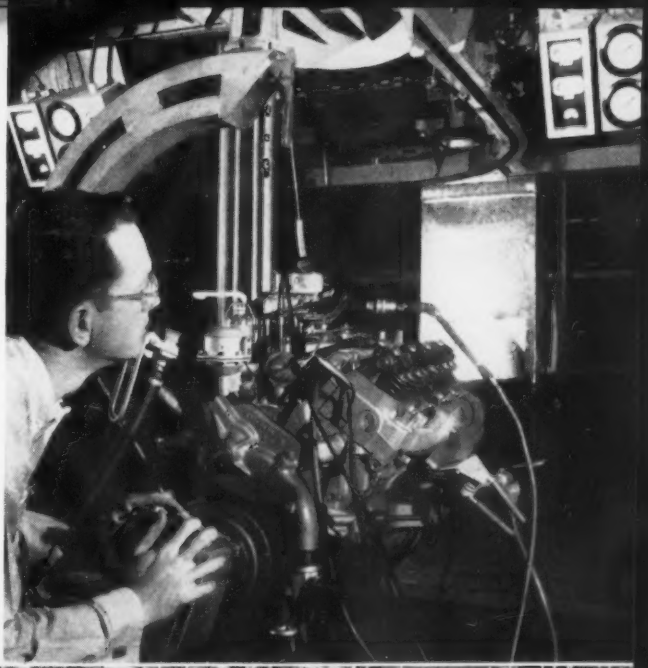
(Left) Precision machining of small parts plays important role in the overall production of Edsel, Mercury, Lincoln and Continental engines. Sixteen drilling and reaming operations are handled by this automatic machine as rocker arms are moved through the various stations of the machine.

◆

(Below) Drilling, milling and tapping operations are performed on an exhaust manifold as it passes through the 28 stations of this automated machining line.



(Right) Ford Motor Company's technique of combining engine balancing with hot testing provides the advantage of dynamic balancing at speeds and operating conditions encountered in actual use. This electronic balancing unit indicates engine speed, the location of unbalance, if any, and the size weight that is to be added when necessary.



◆

(Below) A well-equipped toolroom is used for maintenance and repair of tools needed in engine machining operations. The toolroom is centrally located within the plant for easy access from all production areas.

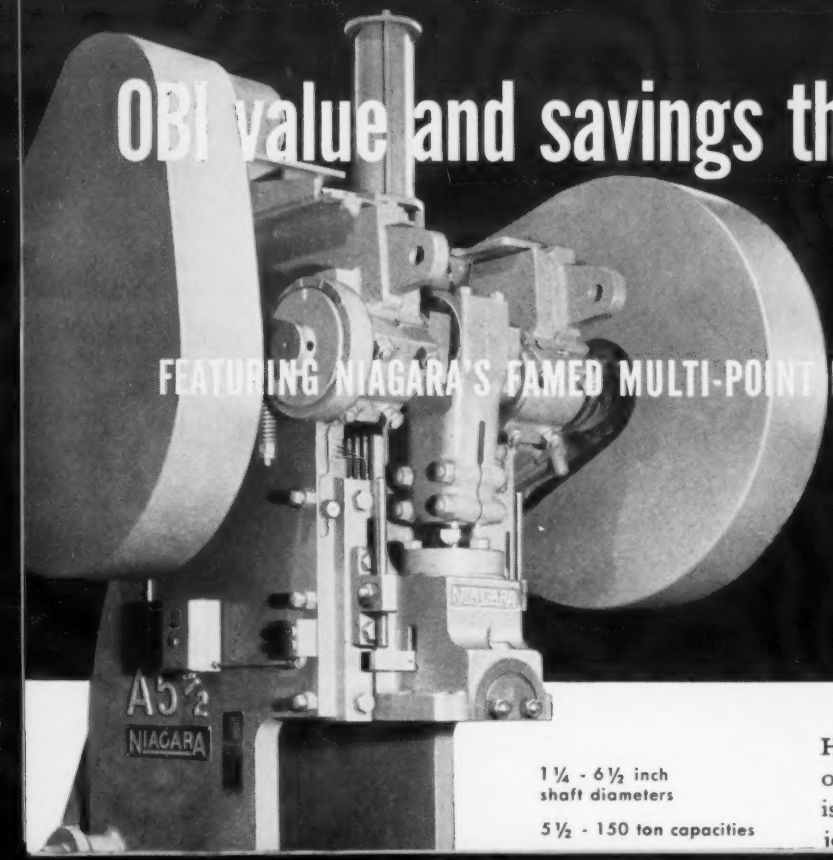


TON FOR TON . . . DOLLAR FOR DOLLAR

OBI value and savings that can't be matched

FEATURING NIAGARA'S FAMED MULTI-POINT MECHANICAL SLEEVE CLUTCH

Picks up load on 14 engaging jaws. Applies driving force concentrically without keys or pins. Assures instant engagement and maximum productive strokes per minute. Needs no air nor electricity. Practically no maintenance. Greater safety: Simplified controls, fewer parts to wear out. *Yes, it permits, inching, too.*



1¼ - 6½ inch
shaft diameters

5½ - 150 ton capacities

Here's a workhorse that's known for setting the pace on the most demanding jobs... jobs where the clutch is engaged and disengaged at every press stroke... jobs that call for operation three shifts a day, day in

Presses have amassed an unusual success record in thousands of applications. To be specific, let's take a

5½ - 150 ton capacities

is engaged and disengaged at every press stroke... jobs that call for operation three shifts a day, day in

Presses have amassed an unusual success record in thousands of applications. To be specific, let's take a close look at a Series A user:



28 OBI'S SINGLE STROKED 707,140,000 TIMES WITHOUT ONE CENT SPENT ON CLUTCH ENGAGING SURFACES

Automatically fed for single stroking operations, 28 Series A Presses have produced 707,140,000 parts in the plant of a renowned appliance manufacturer since 1950. Clutches have required but $123.30 in replacement parts. No engaging surfaces have been replaced on any press. Examination shows no measurable wear. Original machining marks still visible.



GET THE FULL REPORT

Write for the complete, documented job study, "707,140,000 Clutch Engagements," as well as Bulletin 58 containing data and specs on Niagara's remarkable line of Series A Inclinables.

**Note: Niagara also builds single and double crank OBI's with Electro-Pneumatic Friction Clutches and Electro-Pneumatic Sleeve Clutches to meet every need. You name it!*

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N.Y.

District Offices:

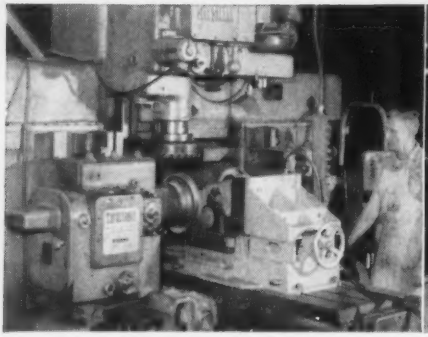
Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia

Distributors in principal U.S. cities and major foreign countries

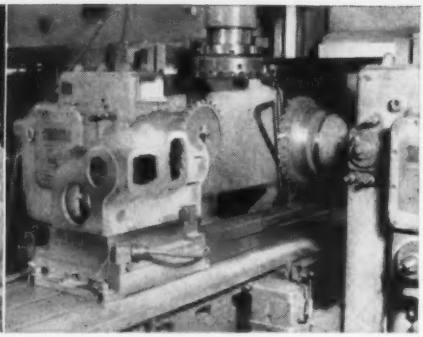
NIAGARA (SERIES A) OBI PRESSES

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work

For more data circle 406 on Postpaid Card



Sundstrand magnetic fixture provides two-way holding for duplex milling ends of case.



Base unit only, used when milling pads on side of case.

ACCURACY, TOOL LIFE & PRODUCTION

improved with SUNDSTRAND Magnetic Fixtures

A manufacturer of road grading machinery now uses two Sundstrand magnetic fixtures for holding transmission cases while milling the ends, top and various side pads on a three spindle Rigidmil. Only two fixtures are required to hold the parts for the three different operations required to complete the milling of the various surfaces. Lot sizes range from 50 to 100 pieces. The two Sundstrand fixtures replaced the four tunnel type mechanical fixtures previously used, eliminating much of the time and fatigue of hand clamping.

Additional Data..



...is available on many interesting and profitable Sundstrand magnetic clamping fixture applications. Write for your copy today. Ask for Bulletin 596M.

SUNDSTRAND

POWER-GRIP ®

SUNDSTRAND MACHINE TOOL CO.

Magnetic Products Division

2531 ELEVENTH ST., ROCKFORD, ILLINOIS

For more data circle 407 on Postpaid Card

for only $565.00*

DUMORE® VERSA-MIL

PORTABLE PRECISION MACHINING

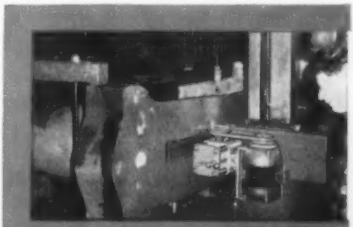


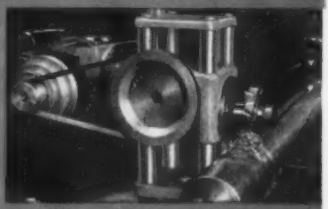
MILLS • BORES • SHAPES
SLOTS • GRINDS • DRILLS *...anywhere!*

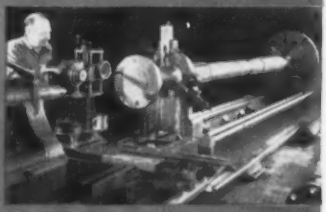
This *new* machine efficiently performs at any angle, in any position or direction, as an independent unit with its own power and feeds, or added to machine tools — lathes, planers, shapers, millers, grinders.

Gives close tolerance results while removing metal at *profitable* rates. Adapts quickly to work on standard machines, fixed machinery in place, pieces in fixtured set-ups, or on parts too big for standard machines. *It gives you the advantage of machining where it is most economical!*

*Basic Unit F.O.B. Racine


MILLING 5" KEYWAY ON A PLANER


SLOTTING 42"-LONG ON A LATHE


BORING AND DRILLING ON SAME SET-UP

FOR MAINTENANCE, SHOP, TOOL ROOM and MASS PRODUCTION USES

GET THE FACTS NOW . . . WRITE

DUMORE PRECISION TOOLS

AUTOMATIC DRILL AND TAP UNITS
MICRO DRILLS
TOOL POST AND HAND GRINDERS

THE DUMORE COMPANY
1302 Seventeenth Street, Racine, Wisconsin

For more data circle 408 on Postpaid Card



Milling Applications

By COLIN SHARP
Metal Cutting Tool Division,
Brown & Sharpe Manufacturing Company

Here described are some unusual uses for milling cutters which could possibly inspire additional applications.

I dare say that a milling cutter to most readers of this magazine is considered to be a tool whose purpose merely is to mill a part made of cast iron or steel for assembly into an automobile, a gun, a machine tool, or any one of the myriad products fabricated from metal. A close look into the files of a major cutter manufacturer, however, would disclose a much wider scope and variety of items requiring the application of milling cutting tools.

There is scarcely any object in use in our daily living that is not in some way subjected to the action of a milling cutter. They are used to help make our breakfast food, cut the teeth in our electric razors, mill parts for our automobiles as well as the machinery and equipment we work with all day. They make the molds for our after-dinner cigars, help to make the needles with which our wives darn our socks. Milling cutters are used to

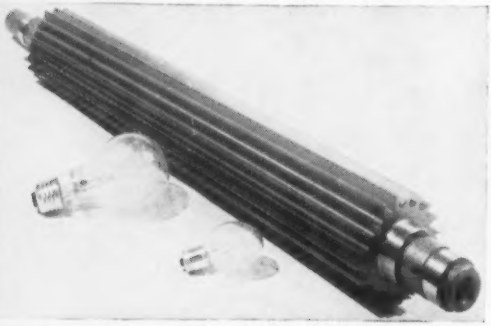


Fig. 1—Cutter designed for milling aluminum foil for use as a flash bulb filament.

make the knives for chipping the cane and beets from which our sugar is made and also they have a part in the grinding of our coffee.

To the foregoing could be added a number of other uses and it is to these applications that we devote the following paragraphs.

How many camera enthusiasts have ever stopped to wonder what the fine, hair-like filament material is made of that they find inside the flash bulbs they use? Is it thin wire or some highly combustible material? Actually, it is neither one. Several manufacturers of flash bulbs use the same type of cutters to mill the filaments. Here the product is the "chips" produced by milling, rather than a part.

A roll of specially treated aluminum foil about 8 inches wide and approximately 0.001 inch thick is fed between a cutter having a very small helix angle and a straight knife. The cutter, as shown in Fig. 1, works similar to a lawn mower. As the cutter operates in timed relation with the feed of the foil, chips of less than 0.001 inch length are cut off. It is necessary, because of the extreme thinness of the work, that a perfect contact be maintained between the cutter and the knife.

In order to obtain full contact, the cutter and knife are lapped in position. The chips must not mat together, but must fall free of the cutter of their own weight and at the same time must interlock together sufficiently well enough to give a good electrical contact for uniform firing. With nothing else to do some rainy night, try taking apart one of the popular walnut size bulbs and count the 120 or more, eight inch long, 0.001 inch square chips contained in it.

A brain specialist came up with a request for a cutter to be used with a new type drill for opening up holes in a human skull preparatory to brain surgery. To avoid damaging the brain tissue, the tool required a design which would provide for the location of a sensitive spring plunger control element inside the cutter. A trepanning type cutter was the answer. In use, as the cutter mills a small plug of bone entirely through the skull the pressure on the spring plunger inside the cutter depresses the membrane which lines the inside of the skull similar to the membrane lining inside an egg shell. When the forward motion of the sensitive spring contacts the membrane, it automatically causes the feed of the drill to shut off, thereby preventing drilling into the brain tissue. After the operation is finished, the milled out disc of bone can be replaced.

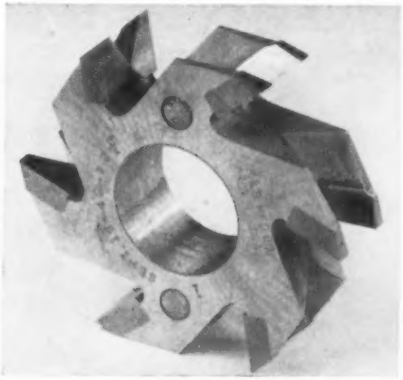


Fig. 2—A two-piece carbide tipped cutter used for milling of bamboo for fishing rods.

Milling Applications . . .

Similar to the filament cutters are ones used for producing "chaff" or "Di-poles." This is the material which our pilots used in the last war to foul the enemy's radar controlled guns. The material looks like Christmas tree tinsel, but isn't. In order to give the foil some body it was necessary to design cutters to fold a right angle into the 1/16 inch wide chip and then cut off. A piece of 0.001 inch thick aluminum foil 8 or 10 inches in length when flat and only 1/16 inch wide will not stand out straight when held in the hand. When bent into a 90 degree angle, each leg 1/32 inch long, it will. This follows the structural steel design idea.

A cutter was designed which would continuously fold, cut, fold, cut as the foil was fed along. Many of our pilots have thrown overboard a box of chaff and had the satisfaction of seeing the shell burst where they were, and knowing that they had contributed to the confusion of enemy radar reception. Another cutter job well done, in this case helping to save lives.

Fishing rod makers needed a cutting tool for the milling of laminated, hexagonal shaped fly rods. Bamboo is quite abrasive, hence, carbide cutters were designed. In order to produce a sharp point it was necessary to make the cutter in two sections for fastening together by means of pins. The specially designed cutting tool is shown in illustration Fig. 2. The next time you go fishing think of the problems encountered and solved by the correct cutter applications on your fishing rod.

In the making of soap flakes, a nationally known manufacturer uses cutters approximately four feet long and six inches in diameter, as shown in Fig. 3. Solid bars of soap are not cut up as might be imagined, but actually the process calls for scoring a thin film of congealed liquid soap. The cutters are made in sections with the teeth forming a continuous helix from one section to the other. The gangs are used,

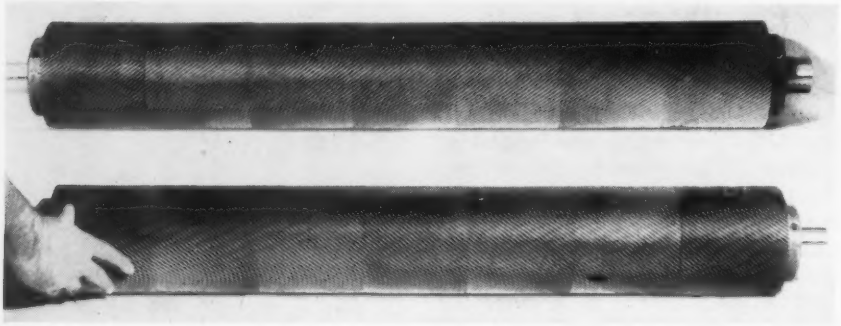
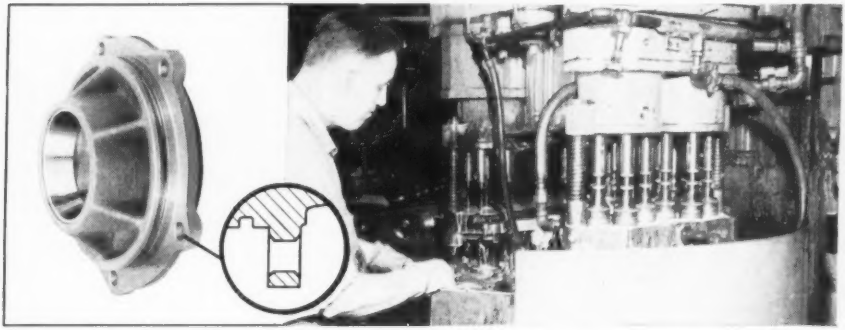


Fig. 3—Set of special milling cutters, four feet in length, designed for the accurate production of diamond shaped soap flakes within very narrow size limits.

Automatic recessing tools simplify back-chamfering operation on multiple-spindle drill!



Here's how Baker Brothers, Inc., designed a simpler machine for drilling, reaming, and chamfering five holes in each of two parts for the Ford Chassis Parts Plant, Sterling, Michigan.

Retainer and bearing cup assembly forgings are drilled and reamed in this four-station machine —then Scully-Jones Automatic Recessing Tools (five in a cluster for two different size bolt circles) feed down to chamfer top and bottom edges of the holes. Chamfering cutters easily fit inside the reamed holes, and when the stop collar of the recessing tool contacts the face of the fixed pilot bushing, radial feed is automatically actuated and controlled by a lead cam within the tool.

Handling of the piecepart has been minimized. The operator just loads and unloads two different parts. Scully-Jones Recessing Tools eliminate the need for turning the work to deburr and chamfer bottom edges. Perhaps you can make major capital equipment savings by using Scully-Jones Automatic Recessing Tools for doing intricate machining operations on drill presses, radial drills, turret lathes, and chucking machines. Adjustments for controlling location and depth of cut are simple, fast, and accurate. Eccentric cam action produces a positive feed. Positioning of the cutter and the cutting cycle itself are fast, efficient operations that assure a high rate of production. Changing tool bit holders or circular form cutters easily adapts your S-J recessing tool to do complex operations, like cutting reliefs, grooving, chamfering, back-facing and counterboring, necking, boring, or a combination of these. Write for Bulletin No. 10-50.



SCULLY JONES **PRECISION HOLDING TOOLS**

SCULLY-JONES & COMPANY
1909 SO. ROCKWELL ST., CHICAGO, ILL.

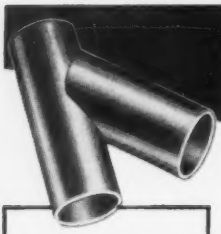
For more data circle 409 on Postpaid Card

one with right hand helix and one with left hand helix so that as the soap passes between the two sets a criss-cross pattern is obtained.

Two unusual specifications are necessary on these cutters; one, that the hole is several thousandths larger than the arbor, the other, that the spacing from tooth to tooth on the cutters must be held within 0.002 inch. Why the large hole? Simply that the soap is so thick that runout can not be tolerated. With an oversize hole, the cutters are free to rest on the contact surface without any influence whatsoever from either arbor runout or spring.

Why the close tolerance on tooth spacing? At first thought one might say to control the melting time of the chips, but this is not the real reason. Uncle Sam requires that the package state the weight of the contents and with automatic packaging, the size of the flake influences the density of the contents, so—accurate control of flake to control the weight is the answer to the problem.

Most individuals at some time in life have had the experience of watching a dentist mix up silver powder with a bonding element then proceed to fill the drilled and cleaned out cavity. In this case the product of a milling cutter is not a part, but is actually the chips. The silver alloy comes in bars and in order to use it effectively, fine powder-like chips of definite size must be made. A special milling cutter does this job very nicely.

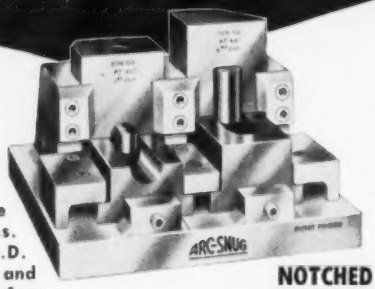


Cuts the FASTEST and FINEST NOTCHES Ever Made!

Combines 2 operations in one . . . to give you the snuggest fitting, angular tubing joints for cheaper, quicker, easier welding.

ARC-SNUG

ARC-SNUG gives you clean-edge, close-fitting, true contour notching by making both the first and second cuts of the notch in a single downstroke of the press. Notches ½" to 1¼" O.D. metal tubing (16 gauge and under) at angles ranging from 35 to 90 degrees. Special sizes and special dies to cut stainless steel, Monel metal, etc., made to order. Dies for various angles and sizes are interchangeable. Write for literature.



NOTCHED SAMPLES GLADLY FURNISHED

VOGEL TOOL & DIE CORPORATION
1823 NORTH 32ND AVENUE • MELROSE PARK, ILLINOIS

For more data circle 410 on Postpaid Card

GUARANTEED

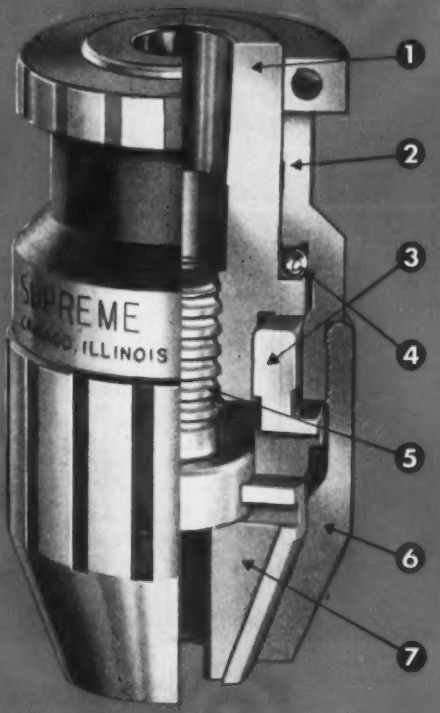
. . . the most precise chuck ever produced

THE NEW *Supreme*
KEYLESS
Precisionist

Made by **Supreme** in **Chicago, U.S.A.,** for the most exacting production line and toolroom use.

- Exclusive **tool steel jaws**
- Precision-quality **ball** bearings
- Unsurpassed **gripping** power
- Unmatched **accuracy**
- Trouble-free **keyless** action
- Controlled **uniform** materials
- Available now: ½" capacity in Tapers #2, 6, 33 . . . ⅜" capacity in #6 Taper
- Available soon . . . ¼" and ⅜" capacities

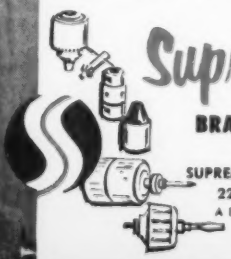
1. **CHUCK BODY**—Ground to extra precision limits. Taper bore air gage checked.
2. **GUIDE HOLDER**—Internal diameters and shoulder ground in one setting. External shoulders precisely located.
3. **JAW GUIDE**—Ground to perfect matching fit.
4. **THRUST RACE BALL**—Hardened chrome steel.



5. **SCREW**—Carbo-nitrided steel.
6. **SLEEVE**—Carbo-nitrided steel, extra high surface hardness. Ground to gage makers' tolerances.
7. **JAW**—Tool steel material, hardened throughout.



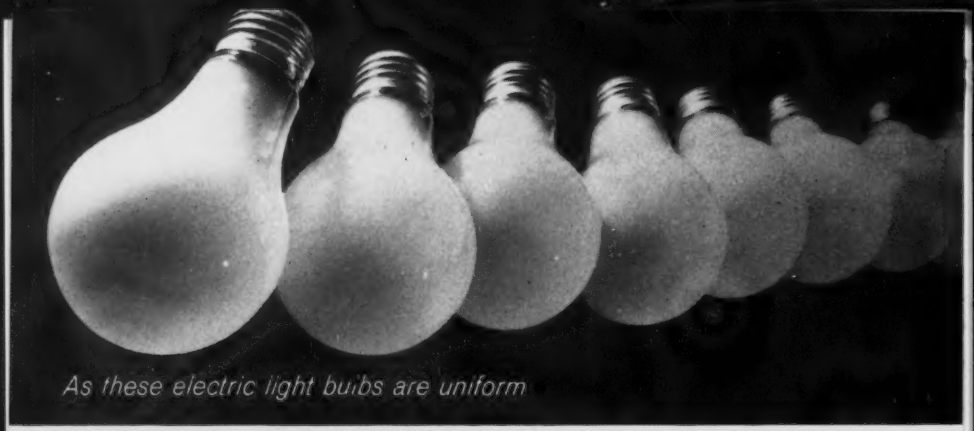
Supreme Industrial Distributors stock them to serve you.



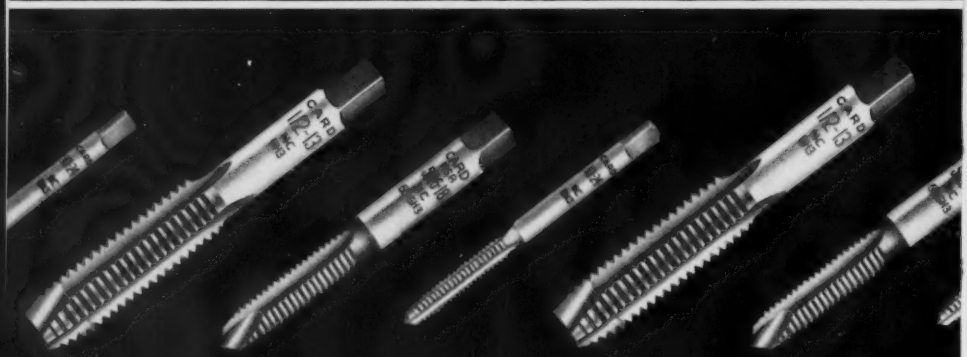
Supreme BRAND Chucks

SUPREME PRODUCTS CORPORATION
2222 S. Calumet, Chicago 16
A DIV. OF A•S•R PRODUCTS CORP.





As these electric light bulbs are uniform



...So Card special purpose taps are uniform, too

Your production's consistent ...because Card taps are uniform

Your first step in consistent production is the cutting tool itself. Because Card taps are identical — and available in many different surface treatments for specialized, difficult applications — they keep production up to par — and predictable. Shopmen know about the uniformity of Card taps — and gages. S. W. CARD DIVISION, Mansfield, Mass. Card Warehouses: Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

CARD

DIVISION OF UNION TWIST DRILL COMPANY

—Serving you through the best distributors from Coast to Coast

For more data circle 412 on Postpaid Card

If you use end mills as fast as welders use welding rods...



This brand cuts down your end mill usage, production time and costs!



The more you use end mills the more you need Union

Union end mills have the uniform top quality that gives you lower costs per piece produced — more production volume per end mill. Union also manufactures drills, milling cutters, gear cutters, reamers, hobs, carbide tools and inserted blade cutters of the same uniform top quality. **Available nationally through Union Distributors** and stocked in Union warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City and San Francisco.

UTD

UNION

TWIST DRILL COMPANY, Athol, Massachusetts

S. W. CARD DIVISION, Mansfield, Mass.; BUTTERFIELD DIVISION, Derby Line, Vt.

See Your UNION DISTRIBUTOR for cutting tools that will save you time and money

For more data circle 413 on Postpaid Card







SCRAP

Floor pit for hoppers speeds handling operations.

In its scrap handling system, Greenlee Brothers & Company, machine tool manufacturer of Rockford, Illinois, parallels many plants in that it utilizes hoppers for scrap collection. But Greenlee has devised some innovations of its own that make its system faster and more efficient than usual.

In three machining departments, for example, hoppers are placed in pits in the floor. Each pit holds four hoppers, and a sign above each hopper clearly indicates which type of scrap goes into it. Scrap is collected from machines and brought to the hoppers in wheelbarrows. Since the tops of the hoppers are at floor level, it's a simple task to tilt a wheelbarow into a hopper. Before the pits were installed, scrap had to be shoveled from wheelbarrow to hopper.

Removing hoppers from pits is accomplished with a simple shop-

((Upper Left) Scrap collected in wheelbarrows is dumped into Roura hoppers set in floor pit. (Center Left) Shop-built hook device placed on fork truck lifts hoppers from pit, after which hook is removed so that truck can carry hoppers to scrap bin. (Lower Left) When lock-handle on rear of hopper is released, hopper tilts forward to dump itself and then returns to upright position and automatically locks.

HANDLING

built hook placed on the forks of a fork truck. The hook fits into hook-eyes welded to the sides of the hoppers. One hook is kept at each pit, and is lifted easily on and off the fork truck by the truck operator. The device is used to lift a hopper from the pit and is then removed so the fork truck can carry the hopper in the usual manner to an outside scrap bin.

Another way Greenlee saves time is by using self-dumping hoppers rather than the box type. This pays off in reduced manual labor at the scrap bin. The fork truck operator raises the hopper to the top of the scrap pile and releases a lock-handle on the rear of the hopper; the hopper tilts forward to dump and returns to an upright position, automatically locking. No manual shoveling is necessary to pile the scrap.

Two hoppers are used to collect scrap at an Ingersoll milling machine. They are stationed in pits at each end of the machine. Chips from the milling operation fall through a grate into an underground vibrating conveyor which shakes chips into the hoppers. Full hoppers are lifted out of the pit by an overhead crane and carried by fork truck to the scrap bin.

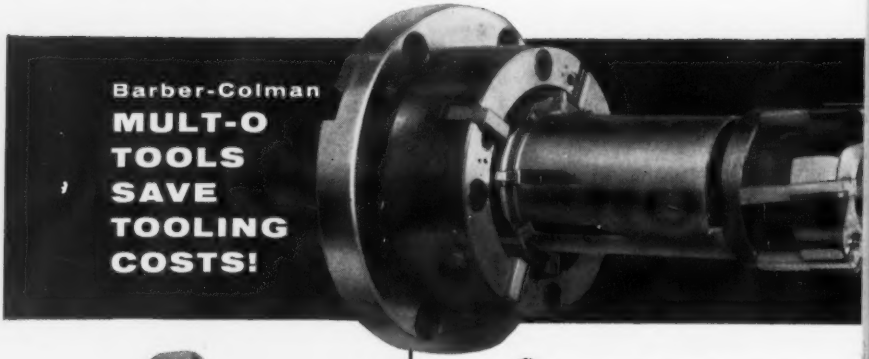
Several hoppers are stationed in the sheet metal department to receive bulk scrap. These, too, are handled by fork truck. They are emptied into containers which are picked up by a local scrap dealer. Non-galvanized scrap is sent to Greenlee's foundry for remelting.

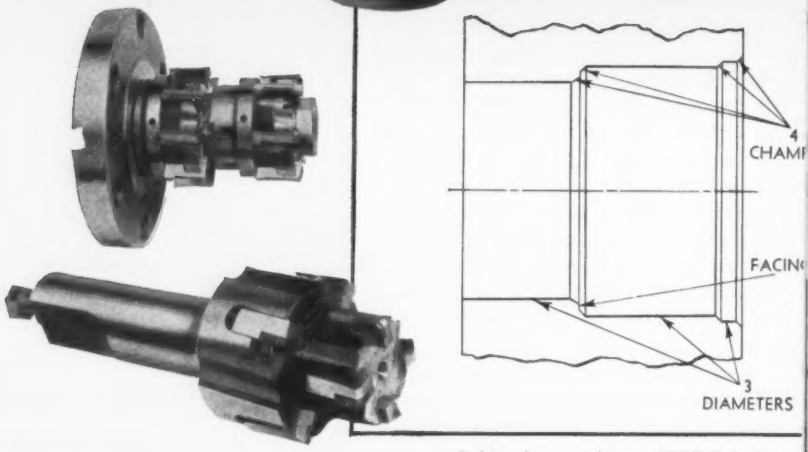




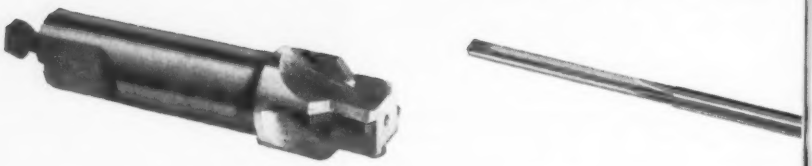
(Upper Right) Two self-dumping hoppers in pits at each end of Ingersoll milling machine collects chips which fall through grate into underground vibrating conveyor. Hoppers are removed from pits by overhead crane and carried by fork truck to scrap bin. (Lower Right) Bulk scrap from sheet metal department is put in hoppers which are emptied into special containers picked up by local scrap dealer.

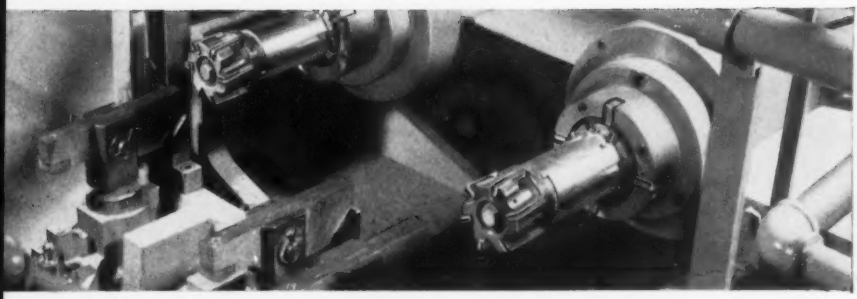
for high-production,
transfer-type machining...





Eight surfaces cut by one MULT-O Tool





These Barber-Colman Mult-O Tools perform 34 machining operations on power steering housings which are processed on a 35-station Greenlee transfer machine. A total of nineteen tools ranging from .220" to 6.250" diameter combine multiple operations for facing, hollow milling, boring, reaming and chamfering.

In most cases, one tool performs several operations. The sample drawing shows the eight surfaces which are cut by one tool. There are four chamfering operations, one facing operation, and the tool reams three different diameters. All tools are designed to perform a maximum number of operations. This combination of operations results in a minimum number of spindles.

Most cutting edges are carbide tipped inserted blades. Carbide tips provide long tool life, and the inserted blades result in low tool cost since only the blades require replacement. Wherever possible, standard blades are used so that they can be obtained from stock. Conventional sharpening methods are used on all tools.

In designing high-production Mult-O Tools of this type, Barber-Colman Engineers consider chip load, finish required, and amount of stock to be removed for determining the number of blades in each tool. Holding means and type of blade mounting are designed to suit each particular application and size of tool.

On this job, machine designers supplied part prints, sequence of operations and production requirements. With this data, Barber-Colman Cutter Engineers designed tools to combine multiple operations for the most efficient results.

Mult-O Tools can also offer cost saving advantages for *your* production operations. If you use multiple operation, transfer-type machining in production, ask Barber-Colman Engineers for analysis and recommendations on cutting tools which produce maximum efficiency. Send part prints and production desired. A representative will be glad to discuss your requirements on request.

BARBER-COLMAN COMPANY

3610 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

For more data circle 416 on Postpaid Card

A CASE HISTORY—

Machining Stainless Steel

Increasing carbide tool size and modifying tool location makes possible successful boring of stainless tubing.

By G. J. STEVENS
Machining Engineer, Armco Steel Corporation

Problem:

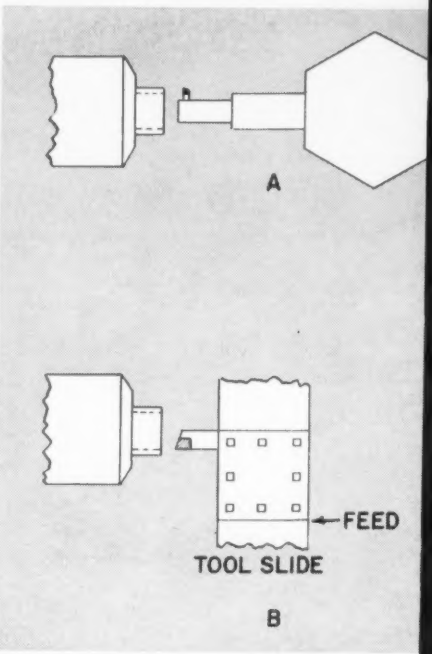
Tool life was shortened considerably and production lowered when a shop was boring 3-inch round Type 304 stainless steel tubing. A 0.062-inch depth of cut was being made in a turret lathe for 1.750-inch depth of bore.

A boring bar mounted in the turret of the lathe was used for this operation (see *A* of the accompanying sketch).

Solution:

It was found that the slight eccentricity experienced with the internal bore of the tubing contributed to early breakdown of the boring tool.

To correct this condition, the size of the carbide tool was increased from ¼-inch square to 1-inch square, and the 1-inch square tool was ground as a boring bar and mounted in the cross slide tool post turret for great rigidity, as shown at *B* in the accompanying sketch.



(A) Former lathe setup used in boring Type 304 stainless steel tubing. (B) Tool setup now used in boring same type of tubing.

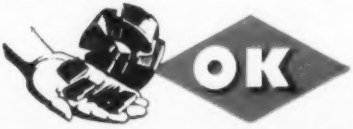


How Heppenstall's hogmill forged die blocks with OK facemills

Close-up made at Heppenstall's Bridgeport shows a 1500 pound, 12 x 20 x 20 inch, Hardtem B forged die block being rough milled with a 14 inch O K 9614XX, extra heavy-duty carbide insert blade facemill, incorporating 10 degree negative axial and radial rake angles. Feed, 150 surface feet per minute. Speed, 8½ inches per minute. Depth of cut, ¼ to 5/16 and often up to ½ inch. Machine, a rebuilt vertical miller with 60 horsepower motor and heavy fly wheel.

IT IS THE SAME STORY EVERYWHERE. Tool engineers prefer O K carbide insert blade cutters for all kinds of tough milling operations . . . facing steel forgings, die blocks, locomotive driving rods, steel castings. There's a reason for this preference. It can be demonstrated by counting the minutes and measuring the metal removed. O K cutters are scientifically designed with various combinations of positive and negative axial and radial rake angles. Scientific designing directs the cutting forces into the body of cutter instead of transversely to the cutting edges. This is necessary because carbides have high compression strength and low transverse rupture strength.

O K cutters are the simplest, the strongest and the toughest ever built. They are heavier, huskier, with more beef in the body. The simple two-piece construction – body and blade – provides more strength and weight to better stand the heavy pull of high powered modern milling machines. Blades are wedge-shaped blocks, the wedge being the strongest mechanical device man has devised. One side of each blade is serrated. Matching serrations are cut into the body. Blades are self-locking, cannot tip or slip. No pins, screws, gibs or locks are needed. To compensate for wear, blades are stepped out one serration and reground. A new set of blades gives you a new cutter. Put your milling problems up to our tool engineers. Write for Catalog 13.



modern milling cutters for modern milling machines

THE OK TOOL CO., INC., 800 Elm Street, Milford, New Hampshire

For more data circle 417 on Postpaid Card

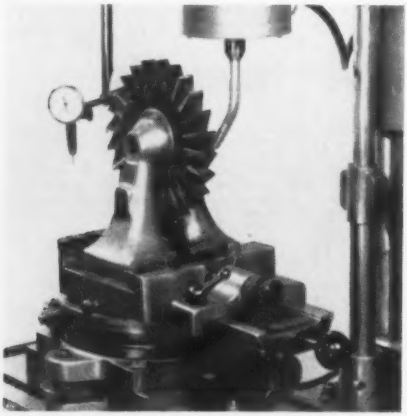
more production through modernization

Techniques for increasing output with newly developed machines and tools.

Edited by LOUIS H. DOERMAN

Unique Carbide Coating Process Increases Cutting Tool Life

Machining of many of the newer materials requires the combined qualities of more than one type of cutting tool. Tools with the wear resistance and hardness of the carbides and at the same time the resilient toughness of the high-speed steels are frequently desirable. There are also many instances in which the cost of carbide tools would not be justified, but for the relatively shorter life of the high-speed tools, which offsets the lower initial cost.

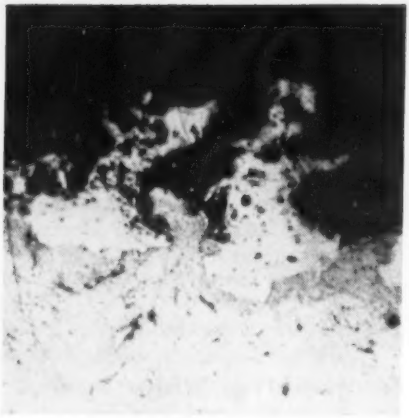


Milling cutter set up in the spark-coating machine. Top miller capacity is 8 inches. Workhead swings on column for setting work.

The recent introduction of the "Sparcard" machine by Impregnated Diamond Products Ltd., whose American distributor is Easco Products Div., Electro Arc Sales Co., offers a means of producing the desirable combination of qualities by depositing tungsten carbide on the surface of other, cheaper tool materials. The machine is similar to a spark erosion machine except that instead of removing material from the workpiece, it deposits material from the electrode onto the work.

The main differences between the two machines lie in the circuitry and the substitution of a vibrator for the servo feed of the erosion machine. The vibrator is fitted with a clamp for electrodes, usually of tungsten carbide. Fine depth setting control is by micrometer. A universal toolholder accommodates single-point cutting tools, reamers, milling cutters and so on.

Tools to be treated should be ground and free from oil, dirt and grease. After the tool has been set in the holder, the electrode is brought almost into contact with it. A spark discharge, derived from a



Treating tool steel produces a sandwich effect. Between the parent metal and hardened surface and subsurface is a soft zone.

D.C. source and condenser controlled, occurs and is regulated with the aid of an ammeter and a voltmeter. The condenser banks are arranged to allow a choice of four settings depending on the finish desired.

A fine surface of the electrode material is deposited on the tool surface which is harder than the tool material. A further hardening of the tool surface takes place at the same time. Normally the treatment is given to the surface of the tool subject to the greatest wear, usually the top rake. Tests made on treated materials show a distinct gain in tool life.

After treatment the surface shows a shallow cratering which presents a satin finish. Photo-micrography shows that the craters are lined with the hard electrode metal and that a hardening effect penetrates into the sub-surface of the treated material. When tool steel is treated, a sandwich effect is produced; the surface and the immediate sub-surface are hardened with a soft zone between these and the parent metal.

For more data circle 70 on Postpaid Card

★ modern machine shop ★

Welding Time Cut In Half

Welding time was cut by more than half when the Republic Structural Iron Works, Cleveland, switched from conventional hand welding to a new type of manual submerged arc welding on a large motor-generator base.

The base is fabricated from ¾ inch mild steel plate. Welded joints on the stiffeners include scarfed butts and ⅜ inch fillets. The operator makes both of these welds with a single pass using 550 amperes welding current. He uses a travel speed of 22 i.p.m. on the butt welds and 17 i.p.m. on the fillet welds. The welds average 6 to 8 inches



The welding gun illustrated herewith permits the operator to concentrate his full attention on guiding the arc along the joint.

long and just fill the butt joints flush. The slag either peels off by itself as it cools, or removes easily with the tap of a hammer. The amount of excess flux is so small that no attempt is made to recover such flux.

The new welder is a Lincoln Electric Manual Lincolnweld, ML-3. It is completely automatic in operation as regards wire feed, flux flow and travel speed but is manually guided by the operator. The gun is joined to the welder by a 15 foot cable through which the wire feed motor pushes the continuous 5/64 or 3/32 inch bare electrode. The gun is propelled along the joint by a small knurled steel wheel driven by a motor coordinated with the welding current which can be preset to any speed up to 70 inches per minute. The circuit includes a magnetic amplifier control which keeps the speed constant regardless of the load or pressure on the drive wheel thus maintaining the preset arc length. The motor and drive wheel can be rotated around the welding gun.

The flux feed system, using low pressure air, employs the principle of fluidizing the granular flux rather than blowing it. Each grain of flux is surrounded and suspended by air so that the flux does not pack or clog the hose or abrade the inside of it. The air passage is through a dryer, into a 100 pound flux reservoir tank, where the welding flux is picked up, and then through the hose to a small reservoir provided in the gun, from which the flux drops by gravity during the welding phase.

Arc striking employs the "hot start" method in which full welding power is on the electrode as it touches the work to establish the arc. Except when welding, the electrode is "cold," that is, without welding power, to prevent accidental arcing between the electrode and the ground.

For more data circle 71 on Postpaid Card

★ modern machine shop ★

Multi-Barrel Slide Honing Machine Cuts Finishing Costs

Eight barrels are rarely associated with firearms. Engineers of the Marlin Firearms Company however are talking in such terms. They are not referring to a new

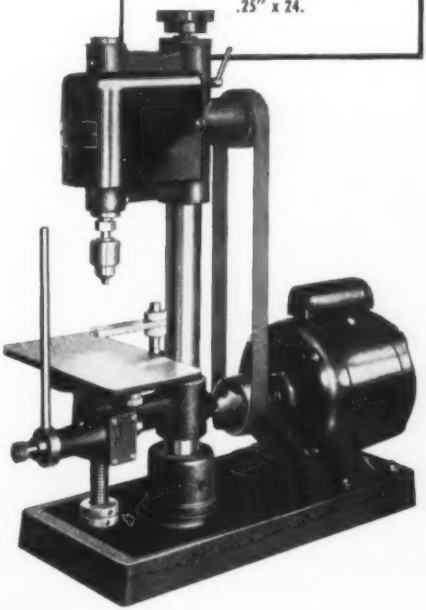


Fig. 1—Eight-barrel slide-honing machine recently installed to finish a variety of small parts in Marlin Firearms Company's plant.

Now *Precision* TAPPING OF THIN AND BRITTLE MATERIALS

Hamilton Super Sensitive, Small-Hole, Precision Tapping Machine.

Capacity — .034" x 120 to .25" x 24.



Recent design change provides a simple homing device as a standard component of the

HAMILTON SUPER SENSITIVE, SMALL-HOLE PRECISION TAPPING MACHINE

and makes routine of such problem work as the tapping of precision holes in thin metal sheets or in brittle plastics. Even improves performance in the tapping of blind holes!

YOU

will want full information about this important development!

WE WILL FURNISH IT

FREE

ask for

BULLETIN No. 2463

ADDRESS

THE HAMILTON TOOL COMPANY
828 South Ninth Street
HAMILTON, OHIO



For more data circle 418 on Postpaid Card

2463

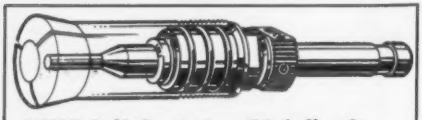


Fig. 2—One of Marlin Firearms' products and some of the component parts that go into it.

type of weapon but a new barrel finishing machine shown in Fig. 1. The Multi-Barrel Slide Honing machine manufactured by the BMT Manufacturing Corp., is used to finish a variety of rifle and shotgun components such as those illustrated along with an assembled weapon in Fig. 2.

The machine consists of a four foot vertical face plate with eight barrels attached at 30 degree angles. As the face plate revolves the parts and media slide from one end of the barrel to the other and simultaneously roll over. In this manner the parts and media describe a figure "8" path. Typical charges for a single barrel are listed in Table 1, together with the running time for each operation and the following operation.

It is reported that on a direct labor basis, the cost of the machine



NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.

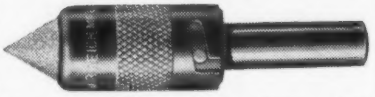
Write for Bulletin.

BYCO INDUSTRIES

2200 Snelling Ave. Minneapolis 4, Minn.

For more data circle 419 on Postpaid Card

ABRASIVE CENT-R-LAP TOOL



Saves time, eliminates diamond dressing. Cones changed in seconds. Available in three sizes: ⅜", ¾" and 1½". Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices. Sold to consumers only.

J. R. REICH MANUFACTURING CO.

201 E. Stroop Rd. Dayton 29, Ohio

For more data circle 420 on Postpaid Card

2548

DIEMAKERS!

this

DIE-PART PORTELVATOR®

(OR AN ENGINEERED VARIANT)

will speed your work
and ease your "handling."

Top plate raises and lowers for fitting operations and rotates 360° to give easy access to die.



Write for our
FREE Bulletin No. 2548.
It gives full details.

THE HAMILTON TOOL COMPANY · 828 SOUTH NINTH ST.

HAMILTON · OHIO · U. S. A.

For more data circle 421 on Postpaid Card

Table 1

PROCESS DETAILS FOR MARLIN FIREARMS' BARREL FINISHING INSTALLATION*

Part Name	Material	Parts (lbs.)	Media (lbs.)	Media Type	Grit (lbs.)	Grit Grade	Compound (lbs.)	Compound Type	Run	Next Operation
336 Receiver	1040	55	110	B	3	60/120	½	A	7 hrs.	Polish
336 Trigger Gd. Plate	1020	19	110	B	3	60/120	½	A	4 "	Polish
39 Receiver	1040	35	110	B	-	-	¾	A	4 "	Profile
39 Tang	1040	32	110	B	-	-	¾	A	3½ "	Profile
39 Breech Bolt	1050	13	110	B	-	-	¾	A	1½ "	Surface Grind
39 Finger Lever	1020	19	110	C	-	-	¾	A	3 "	Blue

A—Finger Lakes Chemical Co.—(Standard T. U.) or Oakite No. 82.
B—¾ by ¾ inch triangles, hard bond, aluminum oxide.
C—Natural Chip.
*Each line refers to a single barrel of the eight-barrel machine.

More Production . . .

was completely recovered in four months. These costs savings were realized without impairing the high finish required for the parts.

For more data circle 72 on Postpaid Card

★ modern machine shop ★

Multi-Unit Automatic for Cast Iron Brake Cylinders

Four units with eight spindles drill, spotface, countersink, tap and ream at a gross rate of 260 parts per hour. A 24 inch index table holds eight work fixtures, four for the first chucking and four for the second. Clamping is manual and unclamping automatic during the final index.

Three vertical units with two-

Multi-Unit automatic for cast iron brake cylinders is illustrated in this view.

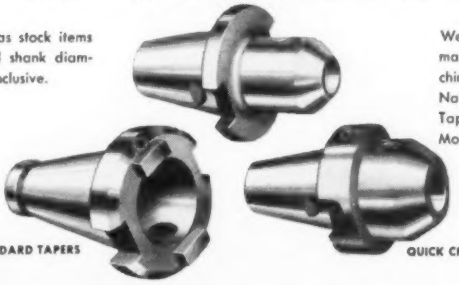
YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON / HOLDERS

FOR END MILLS

Regardless of the type or size of Straight Shank End Mills used the best results are obtained by the use of Weldon End Mill Holders and Adapters. They are manufactured of finest quality material to a high degree of accuracy to assure concentricity of the cutting tool together with maximum holding qualities.

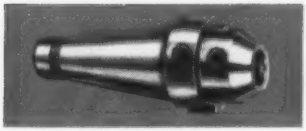
Holders carried as stock items to serve end mill shank diameters 3/16" to 2" inclusive.



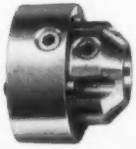
Weldon holders are used on all makes and types of milling machines and boring mills having National Standard Non-Sticking Tapers or the Brown & Sharpe or Morse type of tapers.

NATIONAL STANDARD TAPERS

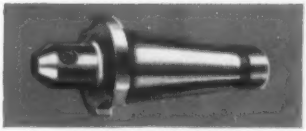
QUICK CHANGE ADAPTER AND HOLDERS



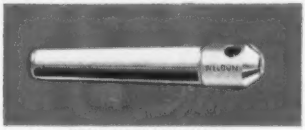
2-SCREW DRIVE HOLDER
NATIONAL STANDARD TAPERS



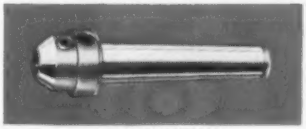
HOLDER WHICH DIRECTLY BOLTS ON STANDARD MILLING MACHINE SPINDLE. DRIVEN BY KEYS ON SPINDLE NOSE



SINGLE SCREW DRIVE HOLDER
NATIONAL STANDARD TAPERS



SINGLE SCREW DRIVE HOLDER
BROWN & SHARPE OR MORSE TAPERS



2-SCREW DRIVE HOLDER
BROWN & SHARPE OR MORSE TAPERS

Catalog list numbers are now marked on all Weldon tools and holders as an aid when reordering . . . another WELDON FIRST.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

For more data circle 422 on Postpaid Card

spindle auxiliary heads operate on two angular holes, one in the first chucking and one in the second. Four of the six tools are combination tools. The horizontal unit drills two holes in the first chucking. Bushings guide all tools except taps.

For more data circle 73 on Postpaid Card

★ modern machine shop ★

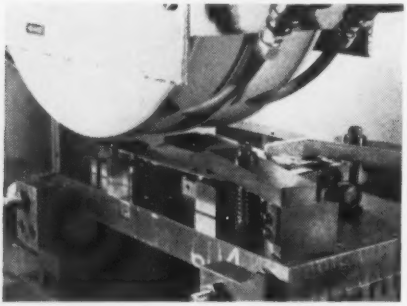
Single Diamond Used to Dress Double Airfoil Grinding Wheel

Airfoil lugs on jet engine blades are now being contour-ground two at a time with a tolerance of 0.0002 of an inch with only one diamond being used to dress the grinding wheel. The single-diamond technique is said to be the latest in wheel dressing of complex contours and double wheels. It succeeds the conventional two-diamond method and was developed by Hoglund Engineering and Manufacturing Co. for Thomson Products' Jet Division, where a 41 machine grinding department produces seven different blade sizes for the Pratt and Whitney J-7S engine.

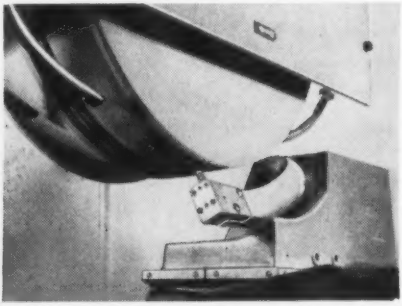
Key to dressing accuracy is cam-control of the diamond so that its point remains normal to the wheel face during the dressing cycle. After about 50 lugs are ground, the dresser moves into position under the double wheel. The diamond starts is dressing cycle at the left-hand corner and proceeds to the right-hand corner. As it traverses the wheel face, the diamond is pivoted about its own point so that it is always 90 degrees to the face.

Inside the dresser is a hydraulically-powered slide. The slide mounts two templates: a contour template to control diamond movement in and out of the wheel during traverse and an angular position template to rotate the diamond. Action of a follower on the contour template is reduced to diamond movement through a ten to one inclined plane cam. This assures the 0.0002 of an inch repeat accuracy. A follower on the angular position template transmits motion to a rack and pinion assembly that simultaneously rotates the diamond.

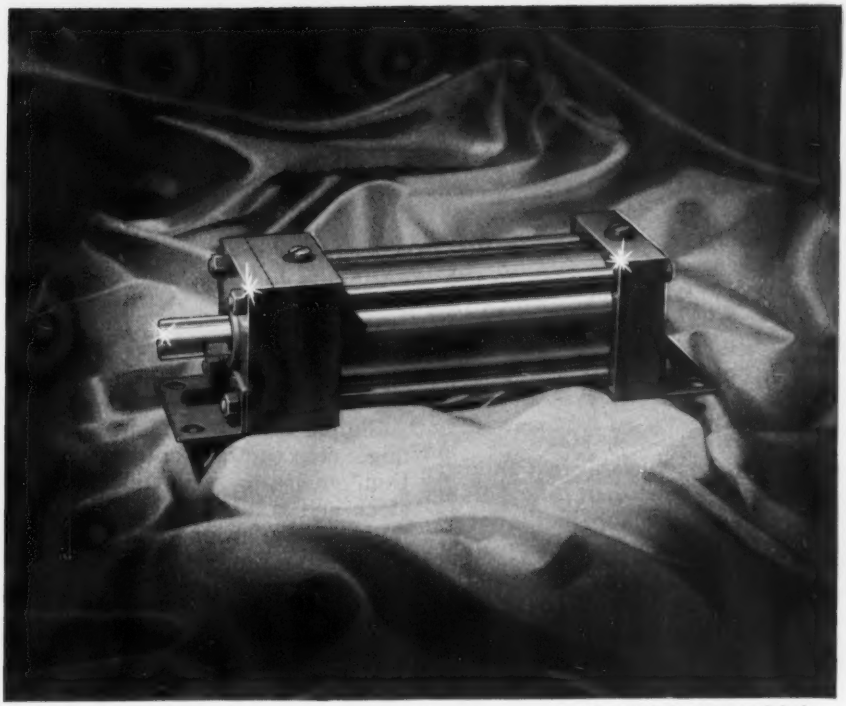
For more data circle 74 on Postpaid Card



Jet engine blade airfoil lugs are ground two at a time, with double grinding wheel.



Key to contouring accuracy is this unique wheel dresser which has a single diamond.



Illustrated– Logansquare Cylinder etc J.I.C. Standards

Look to Logan

the ultimate in air cylinder design



FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
801 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLS.
- ☐ 100-3 AIR-DRAULIC CYLS.
- ☐ 100-4 AIR VALVES
- ☐ 100-5 LOGANSQUARE CYLINDERS
- ☐ 100-6 ULTRAMATION CYLINDERS
- ☐ 300-2 PRESSES
- ☐ FACTS OF LIFE
- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCAST HYD. CYLINDERS
- ☐ 200-3 750 SERIES HYD. CYLINDERS
- ☐ 200-4 AND 200-7 HYD. VALVES
- ☐ 200-6 SUPER MATIC CYLS.
- ☐ 300-1 CHUCKS
- ☐ ABC BOOKLET
- ☐ CIRCUIT RIDER

TO:

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

For more data circle 423 on Postpaid Card

ideas from readers

ideas from readers

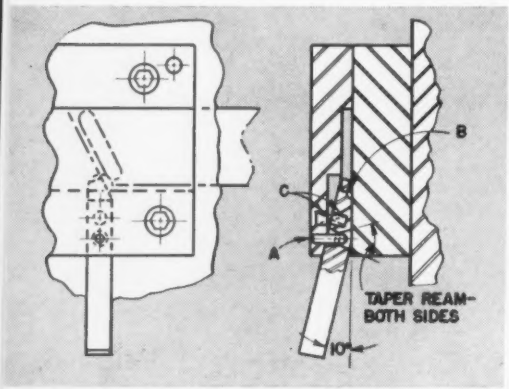
Several time-saving ideas and suggestions for the man in the machine shop.

Finger Stop

By F. MURRAY

The finger stop shown in the accompanying sketch differs from the conventional stop in that it is always in the operating position when starting a strip through the die. After the first stroke of the press, the working end of the stop is lifted manually and the stock fed to an automatic stop (not shown). The finger stop then rides on the top of the stock and, when the strip is finished, it drops down on the die and is then in position to stop the next strip.

Simple to make and install, this finger stop can be readily machined from square or rectangular ground stock and is a working fit in a slot milled in the stripper. The hole for the fulcrum pin, *A*, is taper reamed from both sides, leaving a land of approximately 1/32 inch at the center. Surface, *B*, should be flush with the top of the stock slot in the stripper when the working end of the stop is in the raised position. Spring pockets, *C*, are provided in the stripper and stop. The 10-degree angle for the stop when in the working position is satisfactory in the majority of installations. The working end of the stop is shaped to fit the end of the stock strip.



Sketch of easily-made finger stop for dies that are designed to handle strip stock.

★ modern machine shop ★

Angular Slotted Bushing For Steady Rest

By H. J. GERBER

Supporting a shaft which has a keyway or splines cut along its length is made possible through use of a split bushing of the type illustrated in Fig. 1. The bushing, of

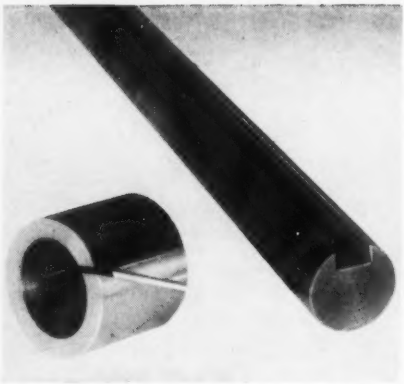


Fig. 1—Angular slotted bushings for supporting a keywayed shaft in a steady rest.

bronze or steel, is first bored to a tight fit on the shaft. It is then split at an angle, either by hack sawing or with a slitting saw in a milling machine. The bushing is now forced onto the shaft and the steady rest jaws are adjusted to a running fit against the bushing, as shown in Fig. 2. If the bushing is bored to proper size, the spring in the bush-

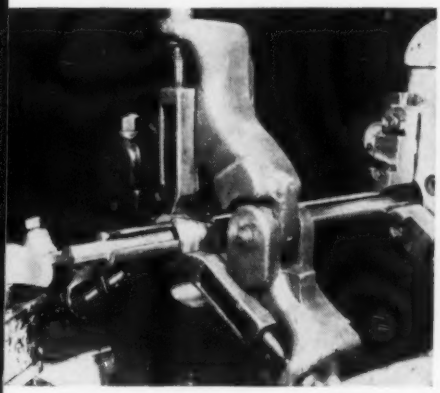


Fig. 2—Angular slotted bushing set up in a steady rest for supporting keywayed shaft.

SPECIFY TOP QUALITY

DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001 to .032".

WRITE FOR DE-STA-CO Illustrated Brochure and Price List!

DETROIT STAMPING CO.

349 MIDLAND AVE., DETROIT 3, MICHIGAN

For more data circle 424 on Postpaid Card

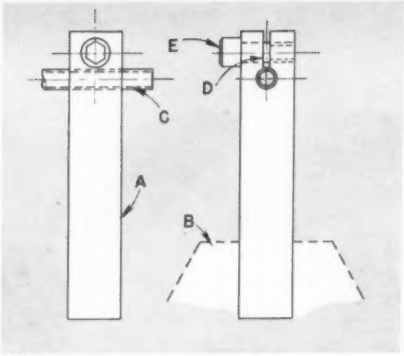
ing will keep it tight on the shaft. Being split at an angle will allow the bushing to run smoothly against the steady rest jaws.

★ modern machine shop ★

Auxiliary Tubing Vise

By ROGER ISETTS

Toolmakers who work with thin wall tubing, such as that used in making coils for induction heating, very often encounter difficulty when gripping the tubing in a bench vise. A simply-made auxiliary vise like that shown in the accompanying sketch will grip thin wall tubing securely without flattening it.



Sketch of simple auxiliary tubing vise.

To make, a square block of cold-rolled steel, *A*, designed for holding in the bench vise, *B*, is drilled to fit the tubing, *C*. A slot, *D*, is sawed in the end of the block *A* and a cross hole is drilled and tapped in the

NEW DRILLS FROM OLD WITH NU-TANGS



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG* process replaces twisted or broken tangs with brand new tangs of correct size — and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion —No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

* Patent No. 2,512,033

write today

NU-TANGS INC. 1335 Bates Street Cincinnati 25, Ohio

For more data circle 425 on Postpaid Card

higher quality — lower costs

APEX SCREWDRIVING TOOLS

The *cost* of a screwdriving tool isn't measured by the *price* of that tool, but by the amount of work it will do for you.

The *cost* of an Apex insert bit ✳, for example, is invariably less than the cost of an ordinary insert bit, simply because an Apex bit will drive so many more screws. Apex insert bits are precision-built of special shock-resistant steel, heat-treated and tempered to the proper combination of hardness and toughness for your specific screwdriving job.

Right now, when every phase of production is being carefully checked for possible economies, it's just good business to look beyond mere price —to actual tool costs. You can start by writing, on your company letterhead, please, for the new Apex Screwdriving Tools Catalog.



✳Apex originated and pioneered the development of the insert bit and bit holder combination, a major advancement in screwdriving techniques.

1933 *A Quarter Century of Service to Industry* 1958

THE APEX MACHINE & TOOL CO.
1027 S. Patterson Blvd.
Dayton 1, Ohio

TOOLS FOR screwdriving nut running FASTENING

For more data circle 426 on Postpaid Card

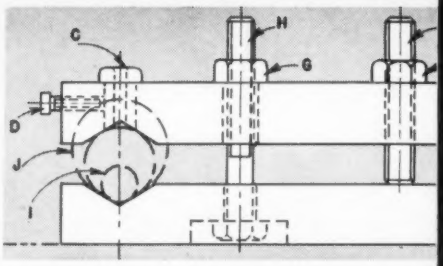
block to accommodate a cap screw, *E*, which, when tightened, will exert pressure evenly around the tubing.

★ modern machine shop ★

Inexpensive Jig for Drilling Various Diameter Parts

By F. C. ELMO

Shown in the accompanying sketch is an economical-to-make jig for use in drilling many different diameter parts. The jig consists of two strap clamps, *A* and *B*, each of which is provided with a vee for accommodating the workpiece to be drilled. The clamp, *A*, also contains a bushing, *C*, for use in guiding the drill into the workpiece held in the V-grooves of the strap clamps. Different diameter holes may be drilled by simply removing the bushing, *C*, and inserting another bushing. The set screw, *D*, serves to hold the bushing in position.



Sketch of economical-to-make jig for use in drilling various size cylindrical parts.

The jig is adjusted to take various diameter workpieces by means of the screw, *E*, and is locked into position by the nut, *F*. Once the jig has been properly adjusted to the particular diameter workpiece to be drilled, the workpiece is firmly locked by tightening the nut, *G*, on the bolt, *H*. The minimum and maximum diameter of parts that can be accommodated in the jig are indicated by means of the dash circles, *I* and *J*. The drill press table on which drill jig is placed during its use is indicated by means of the letter, *K*.



For more data circle 427 on Postpaid Card



For more data circle 428 on Postpaid Card

Is There Anything We Can Help You Straighten Out?



ANDERSON Hydraulic Power PRESS

CHECKS AND BENDS IN THE SAME POSITION

Manufacturers with straightening, checking, and truing operations that require more than ordinary speed and accuracy have found Anderson Power Presses to be the answer to their problems. Here are the results they report:

"Straightened 30 pieces per hour with former equipment. With Anderson Press, 120 per hour. Production increase 400%."

"Anderson Power Press with its complete attachments is definitely more flexible for all types of straightening operations. It is faster, more accurate, and pressure is easily controlled. It is simple to operate."

"Formerly had a tolerance on drawing of plus or minus .002". After installing Anderson Press changed drawings to plus or minus 1/2 thousandth."

These actual reports from users prove that with an Anderson Power Press you get it straight — fast. Profit from low-cost high production, precision straightening.

Write for Bulletin 10-22.

Anderson

ANDERSON BROS. MFG. CO.
ROCKFORD, ILLINOIS

For more data circle 429 on Postpaid Card

news of the industry

news of the industry

Awards . . . obituaries . . . services.

Edited by L. L. BALDHOFF

FREDERICK H. CHAPIN

Frederick H. Chapin, chairman of the board of directors, the National Acme Co., Cleveland, Ohio, died recently at his home in Cleveland Heights. He was 83 years of age. Although not recently in robust health, he seldom missed spending several hours a day at his office.

★ modern machine shop ★

ETTCO TOOL AND MACHINE ELECTS NEW PRESIDENT

Melvin H. Emrick, president and chairman of the board of directors of Ettco Tool and Machine Co., Inc., Brooklyn, N. Y., died recently at the age of 47. He was stricken by a heart attack at his home in Manhasset, Long Island.

Kenneth W. Meytrott has been elected chairman of the board of Ettco. Formerly a vice president of the company, Mr. Meytrott has been a director for over 20 years.

Edward G. Maylinger has been elected president of the corporation. Mr. Maylinger has been associated with Ettco for 32 years.

Both Mr. Meytrott and Mr. Maylinger succeed to their new positions following the death of Melvin H. Emrick, chairman and president of the company since 1947.

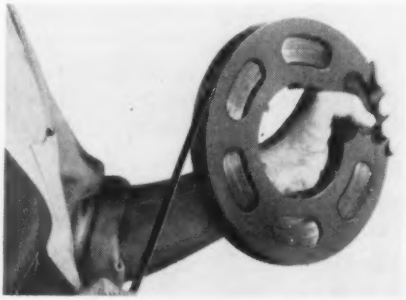
★ modern machine shop ★

VICTOR SAW INTRODUCES NEW BAND SAW BLADE PACKAGE

The Victor Saw Works, Inc., Middletown, N. Y., has developed a new type dispenser package for bulk packaging of its band saw blades.

The individual shipping cartons are 9½ by 9½ by 1½ inches. The blade types and sizes are clearly marked on the outside of each box, thereby eliminating repacking for shipment to the customer.

All Victor Band Saw Blades, up to and including the ½ inch width, are now available in this 100 foot package.



New package for Victor Band Saw Blades

SIZE CONTROL OFFERS NEW COMMERCIAL JIG BORING AND GRINDING FACILITIES

New facilities for jig boring and jig grinding to extreme accuracies have been announced by Size Control Co., Chicago, Ill. The company claims that its jig boring and grinding machines, in working areas rigidly controlled as to mosture, dust and temperature, will provide high precision work to tolerances as close as 0.00005 inch on gages, piece parts and fixtures. The firm further states that the new precision jig boring and grinding services can guarantee manufacturers, in such fields as aviation or missiles and rocketry, accuracies in piece parts of 0.0001 inch under normal conditions and as close as 0.00005 inch in special situations. These extreme accuracies are available in small lot quantities for research and development work and prototype operations. Precision jig boring and grinding, when adequately utilized in the proper working area, can cut production costs by eliminating many of the unnecessary roughing operations in milling machines, lathes and drill presses.

WILLIAM L. DOLLE RECEIVES SERVICE PIN AWARD

William L. Dolle, president of the Lodge and Shipley Co., Cincinnati, Ohio, was recently awarded a 35 year service pin. Presentation of the pin was made by George E. Fee, chairman of the board of directors, senior member of the law firm of Dolle, O'Donnell, Cash, Fee and Hahn.

In addition to receiving his service pin, Mr. Dolle was lauded for his accomplishments in diversifying the

FOR PRECISION MACHINING
TO CLOSE TOLERANCE



SUPER 60 POWER QUILL

High speeds combined with high torque make PRECISE Super-Speed POWER QUILLS the finest tools for precision grinding, milling, and finishing. They can be quickly mounted—with PRECISE mounts—on standard and special machine tools to do the work of single-purpose machines costing many times more.

PRECISE Super 60 POWER QUILL provides spindle speeds up to 45000 rpm with a ½ hp motor and operates from ordinary 110v or 220v power supplies. Its rigid steel housing, precision spindle, and collet chuck permit work tolerances to within .0001 inch. Other models available from 7000 rpm to 45000 rpm with power ratings to 1½ hp. Send for complete catalog.

Precise

Power Quills Grinder Millers Milling Machines Accessories Cutting Tools Vapor-Lub Cooling Systems
Quality and Precision Since 1882

PRECISE PRODUCTS CORPORATION
3745 BLUE RIVER ROAD, RACINE, WISCONSIN, U.S.A.
BRANCH PLANT: PRECISE G.m.b.H., DUESSELDORF, GERMANY

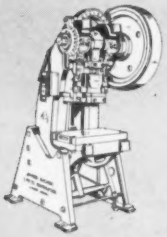
For more data circle 430 on Postpaid Card

company's products and in stabilizing employment. Six years ago the company produced only heavy duty precision engine lathes. Today, this business accounts for only 31 percent of Lodge and Shipley's total business. New product lines developed or acquired during the past six years include Floturn Lathes, power press brakes, power squaring shears, industrial mixing equipment and bottle handling equipment.

★ modern machine shop ★

GISHOLT APPOINTED DISTRIBUTOR FOR CRI-DAN MACHINES

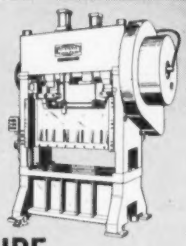
Gisholt Machine Co., Madison, Wis., recently announced that it has acquired United States distribution rights to the line of Cri-Dan High Speed Semi-



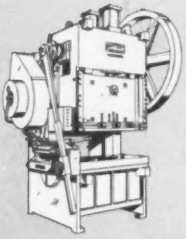
13 models from 16 to 150 ton

INCLINABLE

Single and Double Crank from 40 ton to 200 ton



STRAIGHT SIDE

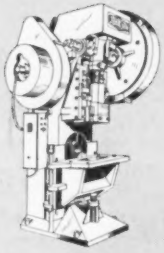


GAP

60 ton to 200 ton

HORN

60 ton model in flywheel and back geared type



"Specs" on 34 models in one easy reference folder

Be sure your file has this quick reference folder on hand. Lists all models in Inclinable, Straight Side, Gap and Horn presses.

Write for Bulletin 1958



Johnson POWER PRESSES

JOHNSON MACHINE & PRESS CORP.

620 WEST INDIANA AVENUE, ELKHART, INDIANA

For more data circle 431 on Postpaid Card

CASE HISTORY NO. 41—DIE SHARPENING

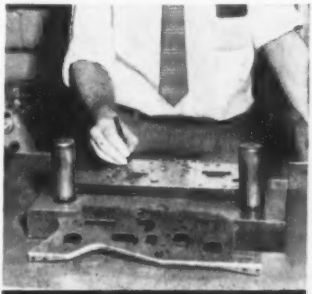


Courtesy: Teletype Corporation, Chicago, Illinois

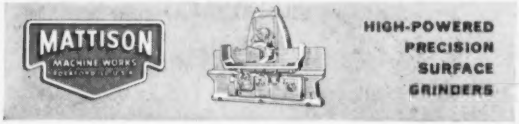
Single setup sharpening of large dies cuts toolroom costs, reduces downtime

Here's how valuable production time can be saved by sharpening large dies on the Mattison High-Powered Precision Surface Grinder. In the Wrightwood plant of the Teletype Corp., Chicago, Ill., entire dies that were once sharpened section by section are now ground intact on this high-powered Mattison grinder . . . a reduction in setup time of up to 83 per cent. The wheel and spindle clearance of these Mattison machines makes it possible to sharpen the entire die without disturbing the lead pins. This means the die can go back to the press directly from the grinder, reducing press downtime.

Your Mattison dealer can arrange for a test grind of your toolroom or production parts in the Mattison Methods Laboratory . . . see him for full details.



Large blanking die is sharpened intact . . . note undisturbed lead pins. Stock removal, .005 in.; burr allowance, .002 in.



For more data circle 432 on Postpaid Card

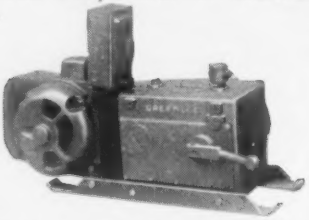
PORTABLE PUMP

for hydraulic rams, jacks, presses, fixtures, etc.

WITH EXCLUSIVE RAPID APPROACH SINGLE- OR TWO-WAY ACTION



No. 798-AC-SA delivers 28 cu in. per min at 10,000 psi Easily carried hydraulic pump . . . fast, simple setup to operate a wide variety of hydraulic units. Rapid approach with automatic changeover to high-speed, and high-power drive are exclusive features. Develops 6,000 psi continuous, 10,000 psi intermittent pressure. 115-230-v, ¾ hp, a-c motor. Available with 4-way valves for double-acting rams.



No. 797 — up to 213 cu in. per min at 10,000 psi Extra-high-speed drive at high pressure. Applies to a wide range of hydraulic systems. Develops 6,000 psi continuous and 10,000 psi intermittent pressure. Delivers 106 cu in. per min of oil at 10,000 psi with 2 hp a-c motor — 213 cu in. with 3 hp motor. Three-phase, 60-cycle, 220/440-v motors. Available with 4-way valves for double-acting rams.

TOOLS FOR CRAFTSMEN
GREENLEE

GREENLEE TOOL CO.

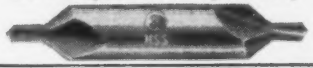
1990 Herbert Avenue, Rockford, Ill.

For more data circle 433 on Postpaid Card

Automatic Single Point Threading Machines. The company is most enthusiastic about the prospects for these extremely versatile, fast machines, as they have wide application in all segments of the American metalworking industry.

These machines are quite similar to a conventional screw cutting machine in both appearance and operation. However, the single point carbide threading tool is cam controlled and is said to provide very accurate lead and thread form on all types of internal and external threads, including multiple start, coarse, fine, left or right hand, parallel or taper, with metric or inch pitches.

Combined Center Drills & Countersink 60°. Super HSS. Top Quality



No.	Diameter Drill	Diameter Body	Length Drill	Length Overall	Price Each
00	0.020"	⅛"	1/16"	1¼"	$1.35
01	0.025"	⅛"	1/16"	1¼"	1.10
0	1/32"	⅛"	1/16"	1¼"	.95
1	3/64"	⅛"	1/16"	1¼"	.80

Delivery from stock. No. 2 & 3 also av.

H. KAPP ENGINEERS

110-07 66th Rd. • Forest Hills, L.I., N. Y.

For more data circle 434 on Postpaid Card

GRIND THE

Eastern Centerless Way

WE SPECIALIZE

20 CENTERLESS GRINDERS

ESTABLISHED 1939

Eastern Centerless Grinding Co.

470 Tolland Street East Hartford 8, Conn.

For more data circle 435 on Postpaid Card

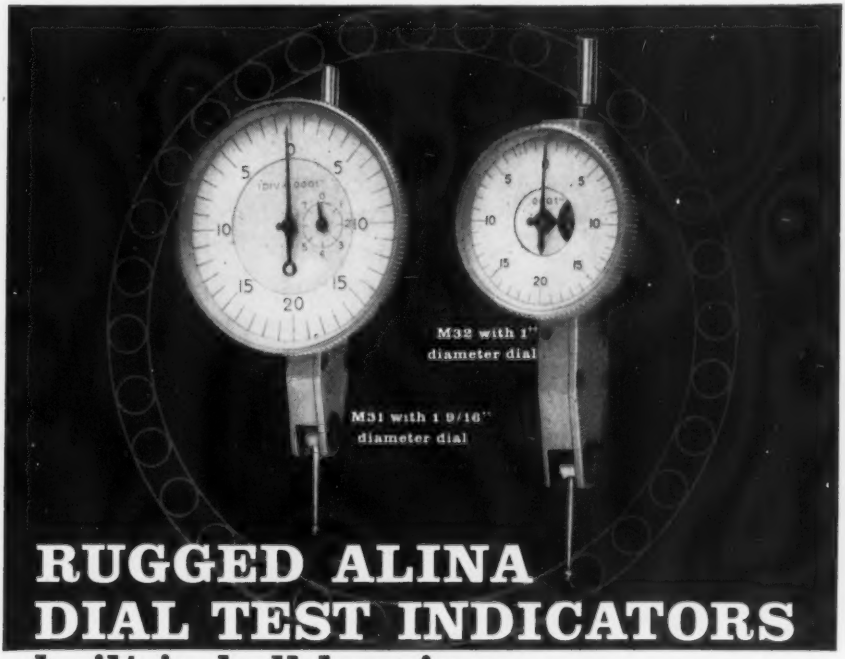
industry news in brief . . .

Norman H. Holland was recently appointed Sales Manager, Athol Division, **Union Twist Drill Company,** Athol, Massachusetts.

Harold B. Swindells has been elected Treasurer, **Laminated Shim Company, Inc.,** Glenbrook, Connecticut.

Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island, has announced appointment of the **Schofield Tool Supply Company,** Marcellus, New York, as Sales Representative in upstate New York.

Albert H. Dall was recently appointed Chief Engineer, Machine Tool Division, **The Cincinnati Milling Machine Company,** Cincinnati, Ohio.



RUGGED ALINA DIAL TEST INDICATORS

built-in ball bearings

for greater sensitivity – reduced pressure – improved accuracy

- Jeweled • Shock Proof • Range .032" • Graduated .0001"
- Reading 0-20-0 • Fully reversible contact point

Available with a wide variety of rectangular or round shanks.

The instruments shown here are part of a complete line of precision DIAL TEST INDICATORS of all types — Write for brochure!

ALINA CORPORATION

122 East Second St., Mineola, L.I., N.Y.

For more data circle 436 on Postpaid Card

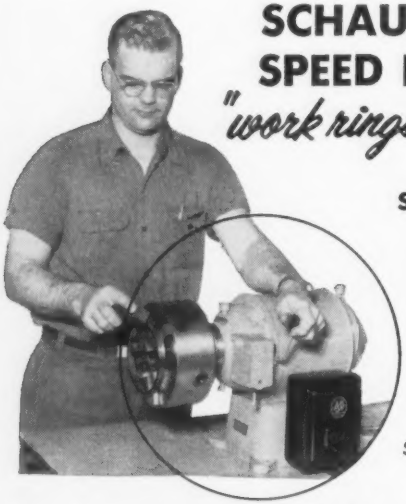
industry news in brief . . .

Herbert A. Stanton, 71, former President and Director, **Norton Behr-Manning Overseas, Inc.,** and Vice President and Director, **Norton Company,** Worcester, Massachusetts, died recently. **John H. Hartleb** has been appointed Field Engineer at the Los Angeles District office.

Wales-Strippit, Inc., Buffalo, New York, has announced the licensing of **Les Ateliers H. Raskin S. A.,** Liege, Belgium, to manufacture and sell all of the firm's products on continental Europe.

Robert C. Gould has been named Direct Sales and Service Representative for Connecticut, **Standard Gage Company, Inc.,** Poughkeepsie, New York. **Edward V. Seero** is the Direct Sales and Service Representative for the remainder of New England. Mr. Gould formerly worked in the New York-New Jersey area, which has been taken over by **Roy F. Leonard.**

William P. Sheffield will assume new duties as Assistant to the General Manager, **Brown and Sharpe Manufacturing Company,** Providence, Rhode Island. Mr. Sheffield was formerly Superintendent of the High Speed Steel Group and **Frank E. Montie** will succeed him in that capacity. **T. Russell Hall** was appointed Assistant Superintendent, High Speed Steel Group. **Patrick G. Lindemann** was named Department Fore-



SCHAUER SPEED LATHES

"work rings around"

OTHER SECONDARY FINISHING METHODS

Stoning hardened steel ring with Schauer Type NA2B Speed Lathe.

These versatile, low-cost machines provide the fastest, most economical method of filing, deburring, polishing or lapping metal and plastic parts. There's a Schauer Speed Lathe to solve practically any secondary finishing problem. Many sizes and models with holding devices to suit the job. *Speed your production* with Schauer Speed Lathes. Write for Catalog No. 530.

SAVE WITH SCHAUER

SCHAUER MANUFACTURING CORP.

4501 Alpine Ave. • Cincinnati 42, Ohio

For more data circle 437 on Postpaid Card

man of the machining sections and **Dimitri Yasinczuk** was appointed Supervisor of Quotation Section for High Speed Steel Cutting Tools.

A. E. Nehrenberg has been named Section Manager-Technical Development, **Crucible Steel Company of America,** Pittsburgh, Pennsylvania. **R. W. Metter** has been appointed Administrator-Patents and Licenses.

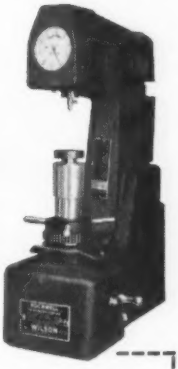
James D. Quirk was appointed Sales Engineer in the St. Louis area, **Capewell Manufacturing Company,** Hartford, Connecticut. This company has announced the opening of a new and expanded office and warehouse at 3050 North Cicero Avenue, Chicago 41, Illinois. The operation is under the supervision of **Bruce S. Williams,** who assumes the post of District Manager in the Chicago-Detroit territory.

WILSON "ROCKWELL"

THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

A Complete Library of Helpful Information on Hardness Testing





No matter what hardness testing requirements you have, there's a WILSON instrument to do the job for you. WILSON's library of hardness testing information has data on applications—the principles of the "ROCKWELL" tester—operation—accessories—conversion tables—the full line of WILSON instruments.

Write for complete details on specific machines. Just check the bulletins of particular interest to you.

☐ **DH-325**—WILSON "ROCKWELL" Hardness Testers, for *most* hardness testing requirements.

☐ **DH-326**—"ROCKWELL" Superficial Hardness Testers, for extremely shallow indentations.

☐ **DH-327**—Special "ROCKWELL" Testers, for unusual applications, including Automatic and Semi-Automatic models.

☐ **DH-328**—TUKON Tester, for precision MICRO and MACRO testing.

☐ **TT-58**—Twintester, which combines functions of "ROCKWELL" and Superficial Testers.

NAME_____ COMPANY_____

ADDRESS_____

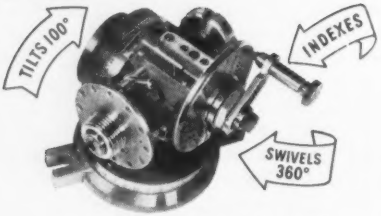
CITY_____ STATE_____

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-G Park Avenue, New York 17, N.Y.

ACCO

For more data circle 438 on Postpaid Card

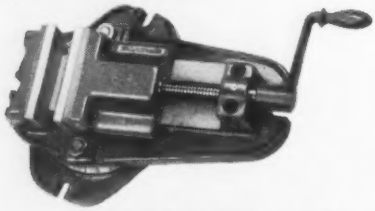
ELLIS



DIVIDING HEADS

6½" or 8" swing
Swivels in 2 planes
Holds work between centers,
in chucks and collets.

ACCURACY



5" MACHINE VISE

Plain or swivel base
Precision ground screw
V-slides with adjustable gibs
Oil hardened and ground jaws

ECONOMY

Save time and money with Ellis tools. Write:

NICHOLS-MORRIS
CORPORATION
76-H MAMARONECK AVENUE
WHITE PLAINS, N. Y.

For more data circle 439 on Postpaid Card

industry news in brief . . .

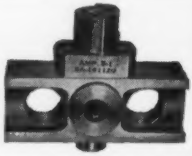
William P. Hanks has been appointed Midwest District Manager and **Robert M. Underwood** has been named Northeast District Manager, Cleveland Tramrail Division, **The Cleveland Crane and Engineering Company,** Wickliffe, Ohio.

George L. Guymon, who has been Vice President and Director of Sales for the past seven years for **Indiana Commercial Filters Corporation,** Lebanon, Indiana, has announced his retirement.

Albert M. Dexter has been named Director of Metrology, **Pratt and Whitney Company, Inc.,** West Hartford, Connecticut. **Chrysostom B. Blanchard** has been appointed Superintendent, Gage Division, Pratt and Whitney, to replace **Harold G. Lucas,** who has retired.

Zagar, Inc., Cleveland, Ohio, has announced the opening of a district office located at 7114 Rising Sun Avenue, Philadelphia 11, Pennsylvania. The manager of the new office is **Harry Hutter.**

NEW
FLUSH PIN AMPLIFIER
OFFERS 5 to 1 AMPLIFICATION



• No dial indicator needed • No master required • Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.
Columbus 3, Ohio

For more data circle 440 on Postpaid Card



When you "Put it on the Blanchard"
... be sure to use Blanchard Wheels

Your Blanchard Surface Grinder is designed to give you peak production and economy on hundreds of different grinding jobs. But, for every job you run, *there's one particular wheel that does it best!* That's why Blanchard manufactures and stocks a wide variety of silicate, resinoid and vitrified bonded wheels and segments.

Your Blanchard representative will be glad to help you select the wheel—or wheels—best suited to *your* grinding operations. Call or write him today. May we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

THE BLANCHARD MACHINE COMPANY
64 State Street — Cambridge 39, Mass., U. S. A.

For more data circle 441 on Postpaid Card

new shop equipmen

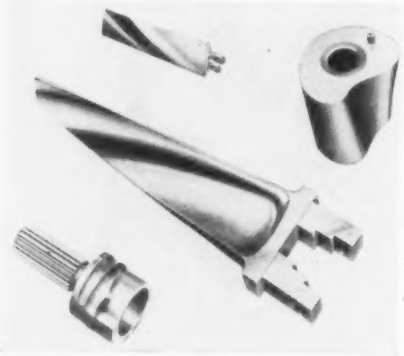
new shop equipment

Descriptions of new machines, tools and materials for metalworking.

NUMERICALLY CONTROLLED MACHINE PERFORMS THREE DIMENSIONAL MACHINING

Machines designed to perform numerically controlled three dimensional machining around the axis of the work are currently being produced by Ex-Cell-O Corp., Detroit 32, Mich. Equipped for milling and grinding operations, they are numerically controlled machines in which grinding, dressing and dressing compensation have been incorporated.

The Ex-Cell-O Numeri-Trol Profiling Machines will produce such parts as cams, templates and airfoil contours of steam turbine buckets and jet engine blades. Parts having irregular and twisted forms can be machined without cams or special tooling. All instructions for the machining operations are recorded on tape. The length of time that is required to make the tape is dependent upon the complexity of the part, but is said to be only a fraction of the time that is required to make the conventional tooling to do the same work on an operator controlled machine.



Cams, steam turbine buckets and jet engine blades can be milled and ground

Ex-Cell-O does not manufacture the control equipment, but designs and builds machines that can be operated from any high performance numerical control system. Of the first two profiling machines, one is operated by a magnetic tape system and electric servo motors, while the other uses punched tape and hydraulic servo motors.

Also, of the first two machines, the purpose of one is the production of steam turbine buckets in relatively small lots. It will handle a range of buckets up to 60 inches long and 11 inches wide. The other machine has been intended for producing cams, templates and prototype jet engine blades.

Some of the advantages of machines with numerical control for these purposes are as follows: (1) Shorter lead time. Prototype parts can be produced in a fraction of the time formerly required. (2) Tooling costs are practically eliminated on this type of work. (3) Quick changeover. After the tapes

and shop materials

new shop materials

Edited by L. L. BALDHOFF

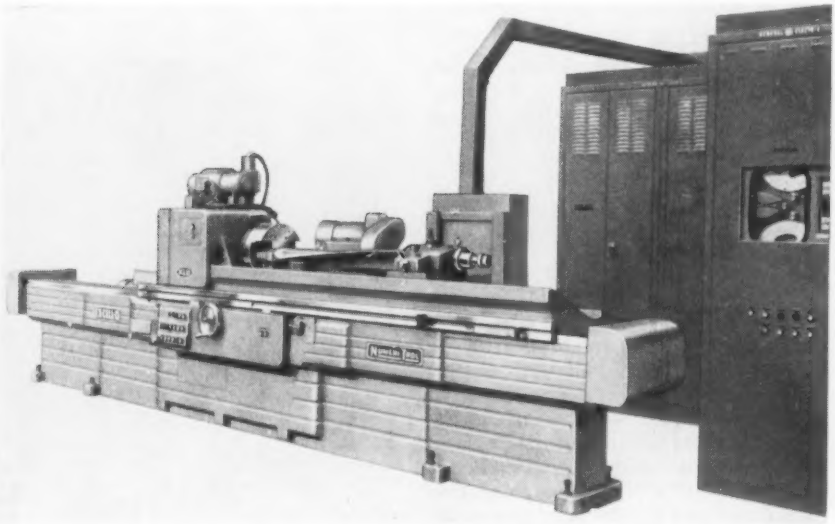
are made, simply insert the proper tape, load the workpiece, set the machine at the zero position and start the cycle. (4) Eliminates costly handling and storage of tooling. (5) Rate of production is controlled by tape. There is no lost time between various phases of work. (6) Eliminates human error in machine operation. (7) Provides consistent production and quality.

For more data circle 75 on Postpaid Card

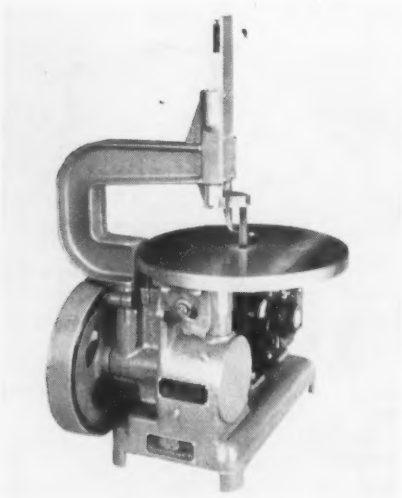
TIMESAVER FOR TOOLROOMS

A contour sawing and filing machine, so simple to operate that all sawing, filing and lapping operations can be handled by an ordinary mechanic, is being produced by Oliver Instrument Co., 2430 East Maumee St., Adrian, Michigan.

With this Oliver of Adrian product, dies and tools can be shaped to dimension fast and accurately—they do



Three dimensional machining of complex forms around the axis of the work is accomplished by tape control on the Ex-Cell-O Numeri-Trol Machine, which is shown above



Oliver of Adrain Sawing and Filing Machine

not require hand filing or other semi-finishing operations. One of its most important by-products is the savings made possible because this machine does not have to be operated by highly skilled workmen. It is available in five types, bench or pedestal.

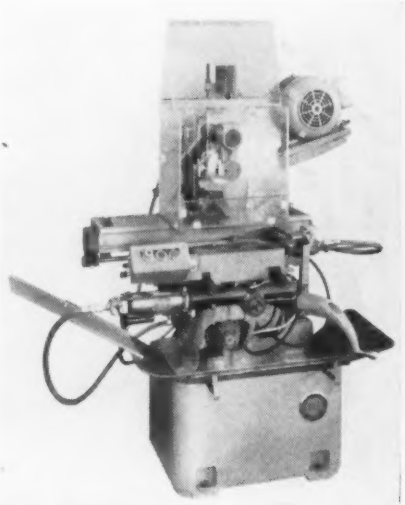
For more adta circle 76 on Postpaid Card

★ modern machine shop ★

AUTOMATIC MILLER FOR SLICING CRYSTALS

The Robert E. Morris Co., REM Sales Division, 5004 Farmington Ave., West Hartford 7, Conn., has announced a series of milling machines with special features for the slicing and dicing of germanium and other crystalline materials which are used in transistors and semi-conductor products. The Nichols 8SA Special Automatic Miller, shown in the illustration, is set up for the plunge cut slicing of germanium into 0.013 inch thick wafers, plus or minus 0.0005 inch. Cutting is done by a diamond impregnated cutting disc, 5 inches in diameter by 0.015 inch thick, rotating at approximately 7,000 rp.m. The vertically held workpiece is plunged into the cutting disc continuously to proper depth, with automatic adjustable table cross feed synchronized with continuous table reciprocation. Table feed is air actuated and quickly variable from 0 to 60 i.p.m. Automatic cross feed is adjustable in increments of 0.001 inch. A copious supply of coolant is fed to the periphery of the cutter by means of special coolant finger collars mounted on the cutter arbor. An adjustable compensator device automatically adjusts table cutting stroke for constant cutting depth when workpieces must be oriented to angles not perpendicular with the cutter.

For more data circle 77 on Postpaid Card



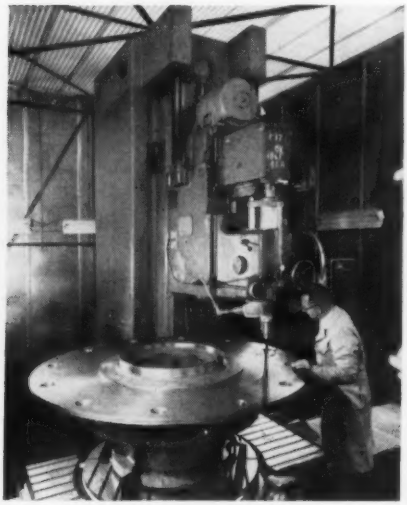
Nichols Model 8SA Special Automatic Miller

PRECISION JIG BORER PROVIDES GIANT WORK SIZE CAPACITY

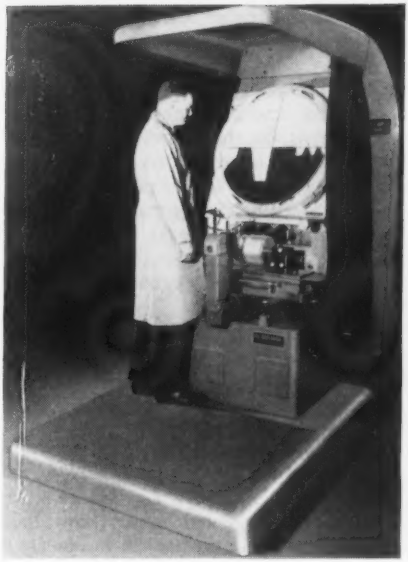
A precision jig borer, with work size capacity that is claimed to be larger than that of any jig borer in the world, has been introduced by Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. Designed for manufacturers whose requirements include machining or inspecting large components with extreme precision, this 4EA Jig Borer is capable of locating accurately to 0.0001 inch and can accommodate workpieces as high as 70 inches. It can bore to the center of a workpiece 80 inches in diameter. This machine is available either with or without numerical control.

This jig borer weighs approximately 26 tons and is expected to find extensive application in the aircraft, missile and atomic reactor manufacturing industries.

For more data circle 78 on Postpaid Card



Pratt and Whitney 4EA Jig Boring Machine



J. and L. Model FC-30ER Optical Comparator

OPTICAL COMPARATOR HAS 80 SQUARE INCH MEASURING AREA

The Model FC-30ER Extended Range Optical Comparator, being offered by Jones and Lamson Machine Co., 521 Clinton St., Dept. 710, Springfield, Vt., has been designed especially for accurately inspecting extra large, heavy parts. Up to 10 inches of lateral measurement is provided, with a ruggedly engineered, roller mounted, heavy duty table. Accurate vertical measurement, up to 8 inches, is permitted through the new double spindle table support. This double spindle construction, combined with the 8 by 32 inch heavy duty table, provides sufficient rigidity for movement and measuring of heavy objects weighing 200 pounds or more.

With the Model FC-30ER, it is possible to project over and under objects up to 8 inches in diameter with-

out interference with either the lens or viewing screen. Accurate setting of the shadow to the chart lines is assured, as the total screen area is easily accessible to the operator.

This instrument is properly hooded and provided with curtains, so that the operator can control screen contrast, regardless of surrounding light conditions.

For more data circle 79 on Postpaid Card

★ modern machine shop ★

MICROSCOPE FOR JIG BORER

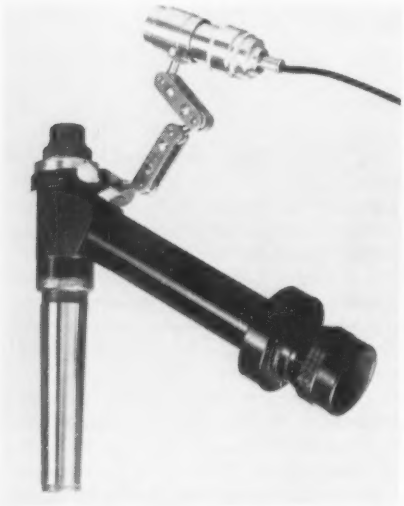
Opto-Metric Tools, Inc., 137MMS Varick St., New York 13, N. Y., has announced an instrument which has been specially designed as a locating microscope in jig borers and similar precision machine tools. Optically it combines at 25x total magnification a fairly large field with sufficient power of observation. The eyepiece contains a hairline cross and is adjustable for individual focusing. Standard shanks are ½ inch straight, No. 2 and No. 3 Morse Taper. As a novel feature, a flexible spot illuminator is available for independence from shop lighting conditions.

For more data circle 80 on Postpaid Card

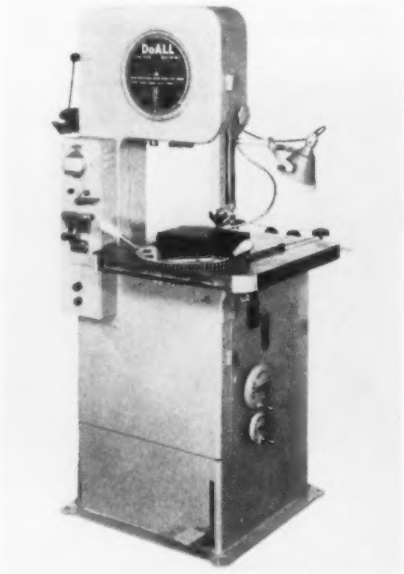
★ modern machine shop ★

BAND SAWING MACHINE IN 16 AND 30 INCH SIZES

The DoAll Co., 254 North Laurel Ave., Des Plaines, Ill., has introduced a line of 16 and 30 inch band sawing machines, designated as the Models 16M and 30M. Accuracy is assured, even under the heaviest cuts, by a heavy tool post and tool post guide. An entirely new Speedmaster variable speed drive efficiently delivers the full



Leitz Microscope designed for jig borers



DoAll Model 16M Band Sawing Machine

output of the one horsepower motor to the cut throughout the entire 50 to 5,200 f.p.m. band speed range. The work table, of a heavy ribbed design, has a surface that is ground for accuracy and etched to eliminate eye strain. The start-stop switch, feed, speed change and band tension handwheels, and the band tension indicator have all been sized and positioned for operator convenience and ease of operation. A full line of accessories is available.

For more data circle 81 on Postpaid Card

★ modern machine shop ★

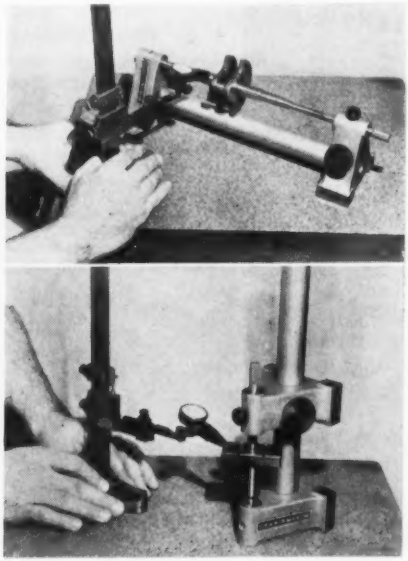
MINIATURE BENCH CENTER FOR INSPECTING SMALL PRECISION PARTS

An instrument type of bench center has been developed by the Taft-Peirce Manufacturing Co., Woonsocket, R. I., for use in inspecting miniature parts which are machined on centers. It answers the demand for a specially designed, precision device for checking concentricity, runout and squareness of face to axis, or outside diameter of the miniature and subminiature parts and components now being widely used in missile, electronic and aviation assemblies.

Designated as the No. 9205M, the Taft-Peirce Instrument Bench Center features a two way design which checks small work on the centers, either horizontally or vertically. It uses a special precision self-aligning shaft, which makes it possible for the workpiece to be set in place quickly and accurately by loosening a single locking knob and sliding the tailstock along the aligning shaft. When the tailstock locking knob is tightened, the centers line up automatically.

For more data circle 82 on Postpaid Card

★ modern machine shop ★



Two views showing Taft-Peirce Bench Center

RETAINING RING KIT

A retaining ring kit is being produced by Bearings, Inc., 3632 Euclid Ave., Cleveland 15, Ohio. This kit contains 376 cadmium plated Truarc Re-



Truarc Kit contains rings in 32 sizes

taining Rings. Shaft sizes from ¼ to 2½ inches in the three most used Truarc series of internal, external and universal crescent ring designs are included in this kit. Sizes and designs represent approximately 70 percent of the retaining ring sizes now being used in industrial, automotive, aircraft and marine applications.

All rings meet the National Aircraft Standard, NAS 669 and NAS 670. The cadmium plating insures that all rings will have long life in the kit or installed in equipment.

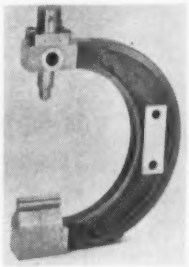
For more data circle 83 on Postpaid Card

★ modern machine shop ★

NEW DEVELOPMENT FOR QUALITY CONTROL ON GEARS

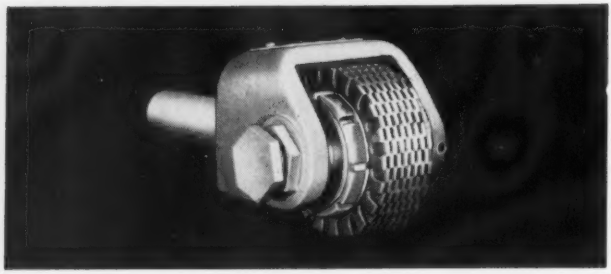
The problem of checking the pitch diameter of gears, splines and worms has been simplified by a new gaging device, which is available from Holmes Gage and Development Corp., Columbus 3, Ohio. Speedy checks with accuracy are claimed for the product, which features a sturdy mechanical amplifier mounted on the gage body to amplify measurements five times. A step on top of the amplifier unit shows whether or not minimum or maximum tolerances are exceeded. For utmost precision, the steps are ground with a tolerance of plus 0.0000 and minus 0.0005.

For more data circle 84 on Postpaid Card



Holmes Gaging Device

PRECISION DRESSER



Desmond precision ball bearing dressers can replace diamonds on surface, centerless, and machine grinders in many instances—at substantial savings. Where diamonds are required for extreme final truing, Desmond precision dressers still can be used for semi-finish dressing. Five models available, each with easily replaceable hardened tool steel cutters and dust-protected ball bearings. Ask your Desmond distributor or write direct for catalog and full information.

The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

For more data circle 442 on Postpaid Card

Both NEW *and* DIFFERENT SHELDON 15" PRECISION LATHES



ER60P
5' bed—31" centers

$2350.00 base price F.O.B. Factory (Less Electricals)

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1½" Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5′, 6′ and 8′ bed lengths providing 31″, 42″ and *66″* center distances.

Write for Circular

SHELDON MACHINE CO., INC. 4250 Knox Avenue • Chicago, U.S.A.

Now on display and being demonstrated by SHELDON Dealers everywhere, including:

City	Distributor	City	Distributor
Aurora (Ill.)	Valley Supply Tool Co., Inc.	Elkhart (Ind.)	Niblock Machinery, Inc.
Boston	Chandler & Farquhar Company	Houston	Rex Supply Corporation
Bridgeport	J. L. Lucas and Sons, Inc.	Los Angeles	Harron Rickard & McCone Co. of So. Calif.
Buffalo	Beals, McCarthy & Rogers, Inc.		Seaboard Machinery Company
	O'Connell Machinery Company	Milwaukee	State Machine Tool Company
Chicago	Boyd Wagner Company	Minneapolis	Satterlee Company
	Crown Supply Company	Newark	Ralph Hochman Company
	Harry Lee and Sons Company	New Orleans	Dixie Mill Supply Company
Cincinnati	Cincinnati Machinery Company	New York City	Morris Abrams, Inc.
Cleveland	Garco Machinery, Inc.		Rudolph Bass
Denver	Mine and Smelter Supply Company	Philadelphia	Delta Equipment Company
Detroit	J. Lee Hackett Company	South San Francisco	BHS Machinery Company
	Charles A. Strelinger Company	Tucson	Complete Industrial Supply Company

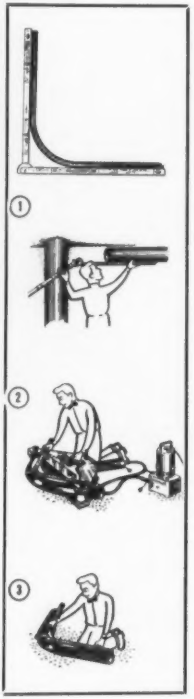
For more data circle 443 on Postpaid Card

new shop equipment . . .

ANGLE GAGE SAVES TIME IN BENDING PIPE AND CONDUIT

Greenlee Tool Co., 1988 Herbert Ave., Rockford, Ill., has developed the No. 1802 Angle Bending Gage that satisfies a basic need and saves time when bending pipe and conduit. A special notched protractor design allows the exact degree of bend to be locked in. Made of durable zinc plated steel with black figures, the gage has an overall length of 70½ inches.

The accompanying illustration shows three basic timesaving uses that apply to almost every bending job: (Step 1) Determining the degree of bend needed is simplified by setting the protractor to angle desired and locking it in position. (Step 2) During the bending operation, the gage can be placed on the frame for easy checking and reference. Each gage



(Above) Greenlee Angle Bending Gage; (Below) three basic timesaving uses

Prompt Service on RAYMOND Chrome Vanadium

DIE SPRINGS



Stock or Special Sizes

Medium, Medium-Heavy, Heavy Duty

Distributed by leading die set manufacturers

Wide variety of hole and rod sizes, lengths, deflections. Increased fatigue life. Reduced down time. *Write for specifications and price list, and name of nearest distributor.*

Raymond Manufacturing Division

Associated Spring Corporation

Corry, Pennsylvania

For more data circle 444 on Postpaid Card

a PROCUNIER TAPPER pays for itself!

Built-in features and operating advantages increase production—reduce costs!



Any way you look at it—you save and gain with Procunier Tappers. It is an uncontested fact, when you use Procunier you are enjoying the advantages of the finest tapping heads. Countless reports indicate tremendous savings on taps, automatic production increases, drastic reduction in parts spoilage, less operator fatigue, fewer "down hours" and precision accuracy in threads and tapped holes. Taking these gains and savings into consideration you can quickly see why Procunier heads "pay for themselves in just a short time!"

Procunier heads offer high speed, quiet operation, a new, powerful drive—with finger tip pressure; economical lightness, "long life" ruggedness and an accuracy and dependability you can consistently count upon! And, there's a versatile model for practically every tapping operation.

Send for FREE Brochure

Find out how you, too, can benefit with Procunier. Get the full construction details—see the many unusual tapping applications — get the "inside story" on why Procunier has led the field for more than 30 years. Write today—now.



MAIL COUPON TODAY!

PROCUNIER

Safety Chuck Co.
12 S. Clinton St.,
Dept. 10
Chicago 6, Illinois

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 10

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

City.....Zone.....State.....

Name.....

Address.....

For more data circle 445 on Postpaid Card

has informative bending data plus a handy rule. (Step 3) After the bend is completed, the gage can be used to check the angle for accuracy.

For more data circle 85 on Postpaid Card

REID

TOOL ROOM ACCESSORIES

CONTROL BALL HANDLES



Round Plastic

Oval Plastic

Round Steel

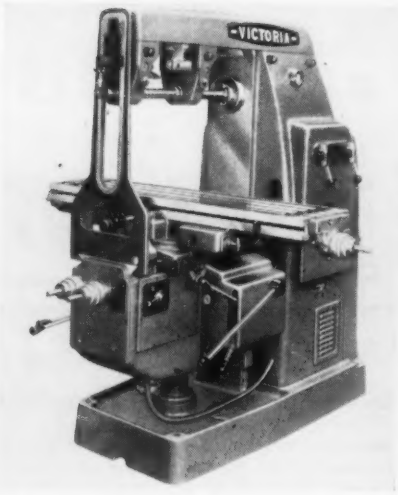
Mushroom Plastic

Round and oval plastic handles are supplied in red or black as wanted. Scores of other needed tool room items available.

FREE New 78 Pg. **CAT.**

REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 446 on Postpaid Card

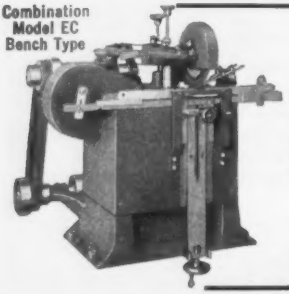


Victoria U2 Rapidmil Horizontal Miller

HORIZONTAL MILLER IS AVAILABLE IN TWO SPEED RANGES

Bentley Industrial Corp., Dept. E-8, 41 East 42nd St., New York 17, N. Y., has introduced a new model of the line of Victoria Milling Machines, the U2 Rapidmil. This machine combines an unusual number of high quality and high production features. Backlash eliminator, mechanical overloads and one shot lubrication have been added to power and rapid traverses in all directions. Two ranges of speeds

Combination Model EC Bench Type



SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING

HACK, BAND, CIRCULAR SAWS

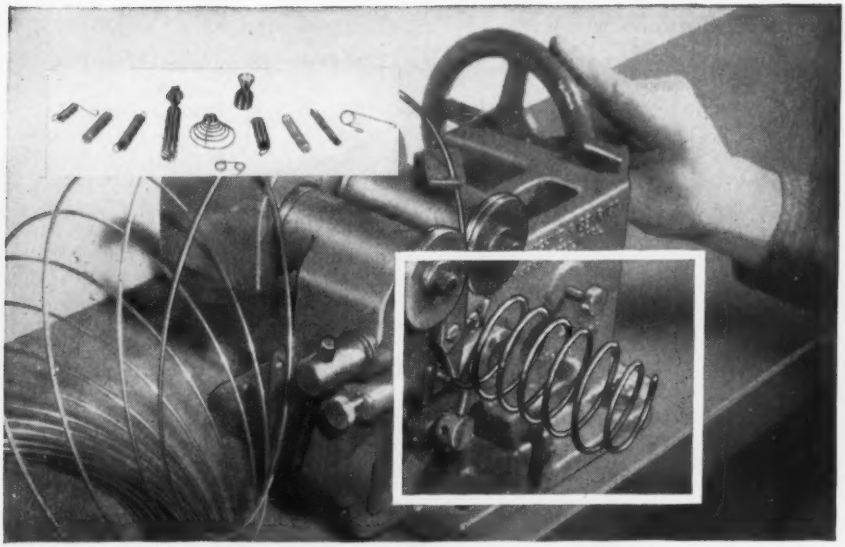
The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information

THE WARDWELL MFG. CO.

3803 RIDGE ROAD • CLEVELAND 9, OHIO

For more data circle 447 on Postpaid Card



Make any type spring . . . fast, exact!

WITHOUT USE OF ARBORS

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005″ to .125″, you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32″ to 12″ and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!

PERKINS
MACHINE AND GEAR CO.
Special Machinery Division,
West Springfield, Mass.



Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

Perkins Machine and Gear Co.
Special Machinery Division, Dept. D1
W. Springfield, Mass.
Please send information and prices on Perkins Spring Coiler.
Hand Model ☐ Power Model ☐

Name.....Title.....
Company.....
Address.....
City.....State.....

For more data circle 448 on Postpaid Card

encompass 30 to 1,500 r.p.m. and feeds extend from 0.65 to 21.5 inches. Nickel-chrome hardened and ground gears run on splined shafts.

The extra heavy spindle carries a flywheel bullgear and rests in Timken taper roller bearings.

For more data circle 86 on Postpaid Card

CYLINDER LINE IS EXPANDED

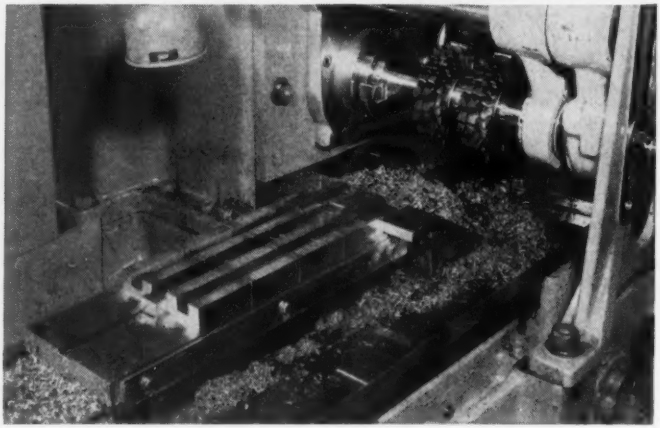
The Galland-Henning Nopak Division, 2758 South 31st St., Milwaukee 46, Wis., has announced the addition of six models and additional bore sizes to its line of 3,000 p.s.i., Class 3, Square Head Hydraulic Cylinders. With these additions, this line now provides a total selection of 19 basic mountings, or models, and bore sizes from 1½ inch through 12 inches.

For more data circle 87 on Postpaid Card

O. S. WALKER

CERAMIC MAGNET CHUCKS . . .

for fast milling set-up!



New Walker extra-power permanent ceramic magnet chucks* are now being used to practically eliminate set-up time on high speed gang milling operations. There are big savings in operating costs too.

Profit from—

- Increased operating speed
- Automatic demagnetization of cutter and work
- Designed-in dimensional stability
- Low chuck height and weight
- Low initial cost
- Almost no operating cost

The use of ceramic magnet chucks as basic milling and grinding fixture plates promises even greater operational savings. For milling applications, a bottom plate with key slots is recommended.

Call your local dealer or O. S. Walker for details.

**Patent applied for*



O. S. WALKER COMPANY, INC.

WORCESTER 6, MASSACHUSETTS, U. S. A.

For more data circle 449 on Postpaid Card

Low cost–high speed hard-facing with the new METCO THERMOSPRAY process



Hard-facing pump rod with
the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

METCO
Metallizing
Engineering Co., Inc.
1177 Prospect Ave., Westbury, L. I., New York
Telephone: EDGEWOOD 4-1300
In Great Britain: Metallizing Equipment Co., Ltd
Chobham near Woking, England

The following trade names are the property of Metallizing Engineering Co., Inc.:
METCO*, ThermoSpray *Reg. U. S. Pat. Off.

Don A. Watson
Metallizing Engineering Co., Inc.
1177 Prospect Ave., Westbury, L. I., N. Y.

Please send me more information

☐ about the New ThermoSpray Gun

☐ about ThermoSpray Hard-Facing

☐ Please arrange a demonstration in my shop.

name_____

company_____

street_____

city_____ zone____ state_____

For more data circle 450 on Postpaid Card

SENSITIVE DRILLING MACHINE

Lennox Tool and Machine Builders, Lima, Ohio, has announced the availability of the Lennox-Demco Sensitive Drilling Machines, which are available in one, two, three, four and six spindle units. They feature a multi-spline spindle of such design that it is said to be impossible for it to drop of its own weight when the operator is through drilling; there is always a constant upward pressure, eliminating all vertical lost motion. The spindle also automatically compensates or absorbs whatever wear takes place. All wear is confined to ball bearings that are housed in a dust proof quill and are pressure held in position.

Side motion is also eliminated. Absence of lost motion in the spindle reduces drill breakage. Positively no adjustment by lock washers for wear is necessary.

Capacity of these drills is 1 inch in cast iron and 5/8 inch in mild steel. General specifications include 12 inch center distance, 7 inch spindle travel and 17 inch table travel.

For more data circle 88 on Postpaid Card



Lennox-Demco Sensitive Drilling Machine

LUBRICATION ECONOMY

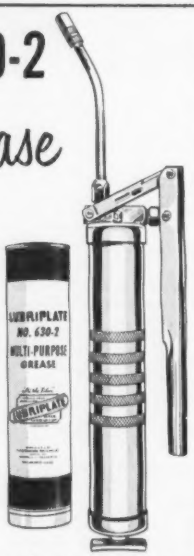
LUBRIPLATE No. 630-2

Multi-Purpose Grease

ALSO PACKED IN

CONVENIENT GREASE GUN CARTRIDGES

Lubriplate No. 630-2 is a high temperature, extreme pressure, water-repellent, grease type lubricant. Ideal for the general lubrication of Industrial, Automotive, Construction, Farm and Marine Equipment. Lubriplate Grease Gun Cartridges provide an easy, quick, economical means of application. Prevent the waste and mess of hand filling. Packed 10 Cartridges in a handy carrying carton.





Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N.J. or Toledo 5, Ohio

The Different LUBRICANT!

DEALERS EVERYWHERE, consult your Classified Telephone Book

For more data circle 451 on Postpaid Card

DiaTest

HIGH PRECISION SMALL BORE GAGE

- **MINIMUM BORE 1/16"**
- **READINGS IN .0001"**
- **RANGE: .057" TO .828"**
- **3 SETS,** fully equipped with Rings and Measuring Heads for complete range.

DiaTest measures out-of-round, tapers, incomplete bores and all other variations to .00008" accuracy.

All parts available separately.

EACH SET complete with dial indicator in walnut case.



SET No.	RANGE	MEASURING HEADS	SETTING RINGS
E-1	.057"-.170"	8	8
E-2	.165"-.390"	9	9
E-3	.372"-.828"	9	9

NEW ACCESSORIES AVAILABLE

- **RIGHT ANGLE ATTACHMENT** — permits gaging without removing work-piece from under bore spindle.
- **EXTENSION RODS**—may be used to length of 30" without loss of accuracy.
- **DEPTH ADJUSTER**—used in conjunction with extension rods, permits readings to any defined depth.

FOSTER SUPPLIES CO.

6122 MILWAUKEE AVENUE, DEPT. MMS, CHICAGO 46, ILLINOIS

For more data circle 452 on Postpaid Card

new shop equipment . . .

AIR OIL MACHINES FOR DRILLING AND TAPPING

Zagar, Inc., 23898 Lakeland Boulevard, Cleveland 23, Ohio, has announced that its 22 inch air oil feed drilling machine extends the use of this type of drilling equipment. Larger work and heavier sections can be drilled, as can a wider variety of materials. The machine will accommodate more and larger drills than the 14 inch air oil machine. The rugged, sturdy base is cast semi-steel and contains all components, piping and control linkage to operate the machine.

Capacity of this machine can be rated in three categories: thrust, torque and ram movement. Thrust capacity: thrust capacity is 2,000 pounds with compressed air at 80 p.s.i. fed into the head end of a 6 inch diameter cylinder. Torque: the 22 inch air oil machine has been designed to mount a 215 frame motor. This can be 5 h.p. at 3,500 r.p.m., 3 h.p. at 1,750 r.p.m., 2 h.p. at 1,160 r.p.m. or 1½ h.p. at 870 r.p.m. Ram movement: controlled or slow feed can be adjusted from zero to a full 6 inches.

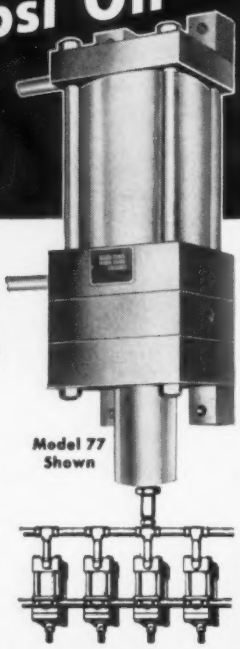
For more data circle 89 on Postpaid Card

Up To
10,000 psi Oil
from
Shop Air!

Miller AIR TO HYDRAULIC
BOOSTERS

No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.

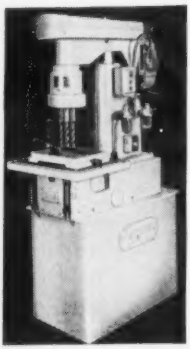


Model 77 Shown

Write For Full Details

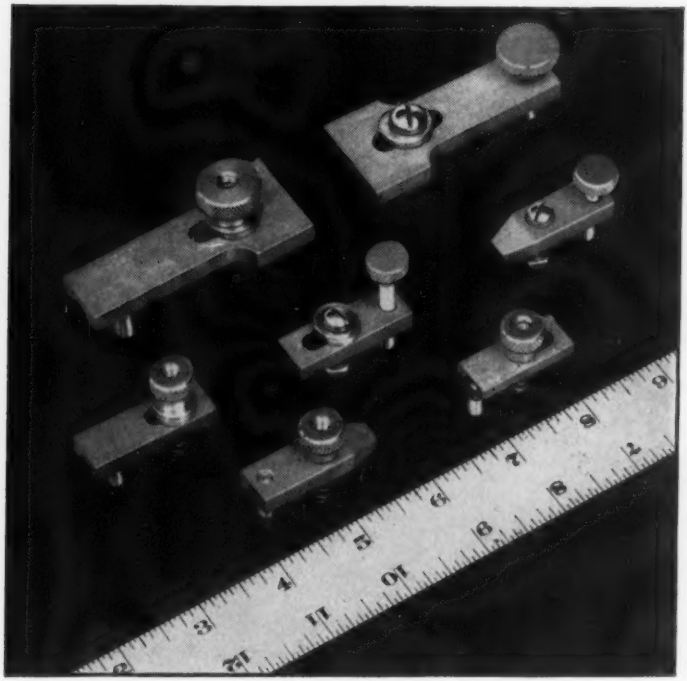
Miller FLUID POWER DIVISION
Flick Reedy Corp
2024 N. Hawthorne, Melrose Park, Ill.

For more data circle 453 on Postpaid Card



Zagar 22 Inch Air Oil Feed Drill

LODDING'S LITTLE FELLOWS



- Non-magnetic—stainless steel type 303
- Tensile strength 90,000 p.s.i.
- Heat resistant—austenitic series (not affected by heat treatment with high resistance to scaling and distortion)
- Corrosion resistant (high resistance to many corrosives including acids)

More than 85 details and 30 assemblies available immediately from stock.

LODDING, INC.
WORCESTER 1, MASS.

Goodwin-Snader Co.
6814 S. Western Ave.
Los Angeles 47, Calif.
Pleasant 3-1553

ATLANTA, GA., WAREHOUSE
54 11th St., N.E.
TRinity 5-7065

Bagby Engineering Co.
1047 Forest Ave.
Evanston, Ill.
Ambassador 2-2273

For more data circle 454 on Postpaid Card

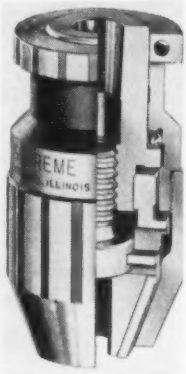
KEYLESS INDUSTRIAL CHUCK

Supreme Products Corp., 2222 South Calumet Ave., Chicago 16, Ill., recently introduced a keyless industrial chuck, which is called the Precisionist. It has been intended for use on the production line and in toolrooms wherever close tolerances are considered a must.

Chrome molybdenum alloy steels are utilized in the jaws of the chuck. Other parts are made of comparable high quality steels, hardened in most instances. Runout of the Precisionist Chuck is guaranteed to be minimum.

The keyless action of the Precisionist produces a time and labor saving advantage that will be obvious to all production men. The ball bearing construction means a 100 percent sure grip on cutting tools, yet allows the chuck to be opened easily with the fingers. The Supreme Precisionist Chuck is presently available in ½ inch capacity in Taper Nos. 2, 6 and 33 and in ⅝ inch capacity with No. 6 taper. Shortly the manufacturer will release ¼ and ⅜ inch capacity chucks of a similar ball bearing construction.

For more data circle 90 on Postpaid Card



The Supreme Precisionist Chuck



For more data circle 455 on Postpaid Card

Weldynamics



ARC WELDING AT WORK CUTTING COSTS

Weld questionable steels with . . .

JETWELD LH-70



- *Outstanding overhead and out-of-position operation*
- *High physical properties*
- *Fast, easy iron powder action*

Jetweld LH-70 operates overhead with the smooth, fast action—and has the high physical properties of a low hydrogen rod.

Produces crack-free welds on heavy plate with a minimum of stress relieving. Reduces the need for preheat on medium carbon steels—makes porosity free welds on sulphur bearing steel.

A.W.S. Classification E-6016.

Look for the three dots • • • symbol of Lincoln quality. Weldirectory of Lincoln mild steel electrodes Bulletin 7000.1 sent free on request.

The World's Largest Manufacturer of Arc Welding Equipment

LINCOLN®

© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY, DEPT. 3521, CLEVELAND 17, OHIO

For more data circle 456 on Postpaid Card

new shop equipment . . .

MINIATURE WRENCH

Armstrong Brothers Tool Co., 5228 West Armstrong Ave., Chicago 46, Ill., has announced the addition to its wrench line of two 15 and 75 degree angle opening miniature wrenches. Drop forged of alloy steel, carefully heat treated and chrome plate finished, these tools fill out a selection of 11 other similar wrenches in various sized openings from 3/16 to 5/8 inch.



Armstrong Brothers Miniature Wrench

The new No. 1136 has 9/16 openings, the No. 1140 has 5/8 inch openings. Both are 5½ inches in overall length with heads 3/16 inch thick.

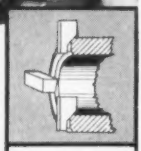
For more data circle 91 on Postpaid Card

★ mms ★



✓ DEBURRING
✓ CHAMFERING
✓ FACING, POINTING

Here is the machine that eliminates the need for tying up expensive lathes and screw machines for deburring rods and tubes, and it profitably replaces such costly methods as hand rolling pieces against a sanding belt or holding them against a rotating brush. The Pines End-Finishing Machine is *fast* and *accurate*. It squares the end, removes all the burr from the inside, and makes a uniform, accurate chamfer on the outside. Women operators commonly deburr up to 800 1-inch tubes per hour. It clamps, feeds, finishes in one motion — leaves one hand free for stock handling. Machine illustrated handles stock up to 2" O.D. Automatic air-clamping units and models for stock up to 5" also available.



Handles deburring, chamfering, facing operations simultaneously.

FREE BULLETIN
Find out how these machines save space and cut costs on wide range of work.

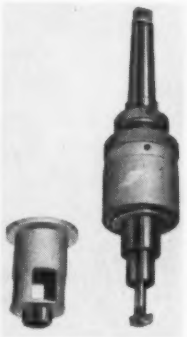


PINES ENGINEERING CO., INC.
Specialists in Tube Fabricating Machinery
644 WALNUT • AURORA, ILLINOIS
PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

For more data circle 457 on Postpaid Card

AUTOMATIC RECESSING TOOL

An automatic recessing tool, designed with single joint construction to solve the chatter problem, was recently introduced by the Madison-Faessler



Madison Automatic Recessing Tool

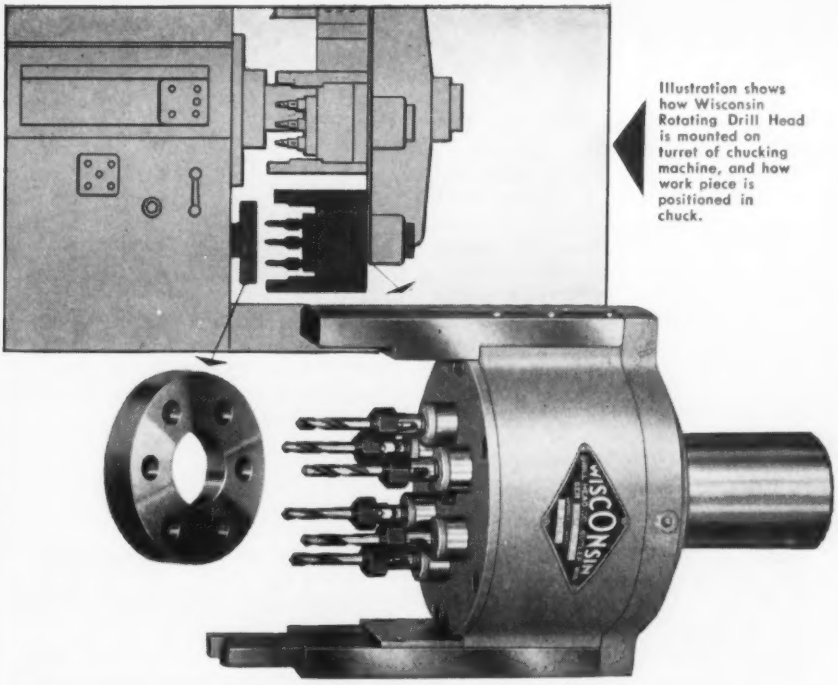


Illustration shows how Wisconsin Rotating Drill Head is mounted on turret of chucking machine, and how work piece is positioned in chuck.

WISCONSIN Rotating Heads for your Automatic Chucking Machines

Rotating Drill Heads and Tapping Heads by Wisconsin are winning wide favor because of their efficient performance on popular makes of automatic chucking machines and lathes. If you have a drilling or tapping operation to perform at low cost, consider the application of one or more of these heads specially engineered to your specifications. The Wisconsin engineering staff is qualified by training and experience to assist you in tooling for high speed, low-cost production. Send your "specs" and prints for quotation.

CONSULT OUR FIELD ENGINEERS OR WRITE —

WISCONSIN DRILL HEAD CO.

4983 NORTH 124TH STREET • BUTLER, WISCONSIN

For more data circle 458 on Postpaid Card

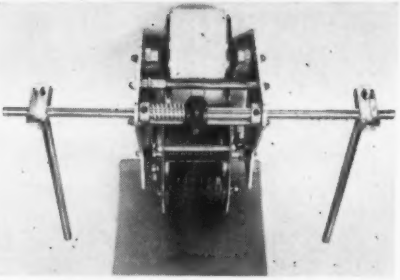
A8-9447-½I

Tool Co., 235 North Fifth St., Department M.S., Moberly, Missouri.

The manufacturer states that, because the toolholder is a long solid bar with an extremely long supporting surface, tool deflection and runout are eliminated. Closer control of tolerances and location of grooves are also said to be achieved.

Another feature is a snap-on adapter which converts the tool for piloting either in a fixture or in the work. A single tool with a simple conversion thus performs the work of two tools, thereby substantially reducing inventory requirements.

For more data circle 92 on Postpaid Card

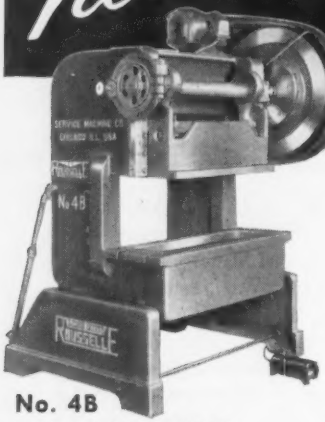


Pryor Model B Consecutive Numbering Unit

AUTOMATIC CONVEYOR LINE CONSECUTIVE NUMBERING UNIT

Pryor Marking Products, 434 South Wabash Ave., Chicago 5, Ill., has announced its Model B Automatic Conveyor Line Consecutive Numbering

New 40-TON DOUBLE CRANK O.B.I.
ROUSSELLE

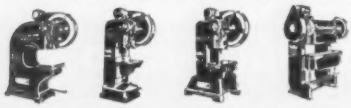


WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

No. 4B
ROUSSELLE PRESS

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



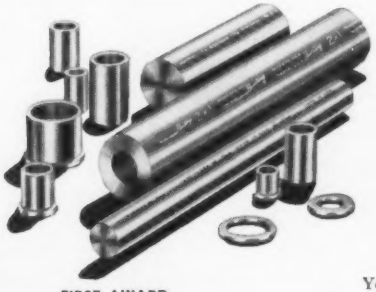
SERVICE MACHINE CO.
Mfrs. of Rousselle Presses
2310 WEST 78th STREET • CHICAGO 20, ILL.

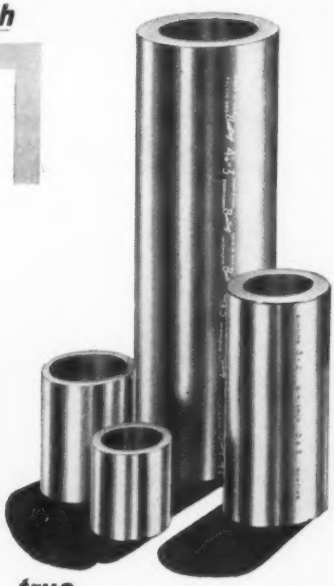
ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS
For more data circle 459 on Postpaid Card

. . . now your distributor can supply ***both***

Bunting®

CAST OR SINTERED BRONZE







FIRST AWARD
For Advertising Excellence
Distributors Associations
1952 1956 1958

true . . .

You can't feel nor see under the surface structure of a Bronze Bearing or Bar. In the absence of complicated analyses and tests the character of the maker is your only assurance of uniform quality. Countless engineers and mechanical men know that Bunting Stock Bearings and Bars are as perfect as the finest and most expensive special blueprint production.



. . . buy **Bunting** Bearings from your **Bunting** Distributor

Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Ask your local Bunting distributor or write for catalogs.



Bunting®

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL

ask for

Catalog No. 52 . . **CAST BRONZE**

Catalog No. P-56 . . **SINTERED BRONZE**

THE BUNTING BRASS AND BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

For more data circle 460 on Postpaid Card

Unit. This unit is entirely automatic. It has been so designed that it can be mounted on any existing conveyor line by means of two adapters and two vertical mounting rods, which are furnished with the unit.

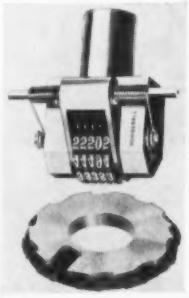
It will print from bottom or top, as well as either side of the box or case being numbered. The Model B is equipped with six automatic wheels, containing ½ inch rubber numbers. The unit has its own foam rubber ink wheel, which holds sufficient ink for 24 to 30,000 impressions. Letters can be inserted in place of numbers.

For more data circle 93 on Postpaid Card

★ modern machine shop ★

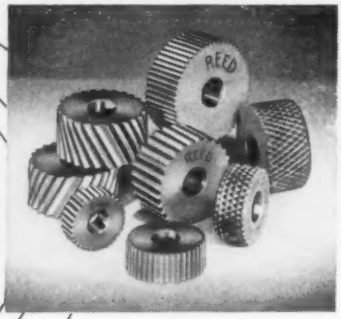
AUTOMATIC NUMBERING HEAD

Shown at the top in the accompanying illustration is the Model 50 Automatic Numbering Head for numbering in consecutive sequence, and below is an enlarged view of one of the wheels. This is a product of Numberall Stamp and Tool Co., Huguenot Park, Staten Island 12, N. Y. The index plate, a very important part in the functioning of the numbering head, has in the past always been attached to the wheels with rivets. As



Numberall Automatic Numbering Head

REED KID ©
KNURLS
CIRCULAR and DIAMETRAL PITCH



170
STYLES and SIZES IN STOCK

For automatic screw machines and turret lathes. The lapped finish on the hard knurling surface contributes to outstanding performance and longer life.



SPECIAL KNURLS
Made to Order

We're constantly helping manufacturers solve their special knurling problems. Let us help with yours. Prices for special knurls quoted upon receipt of blueprints or detailed specifications.

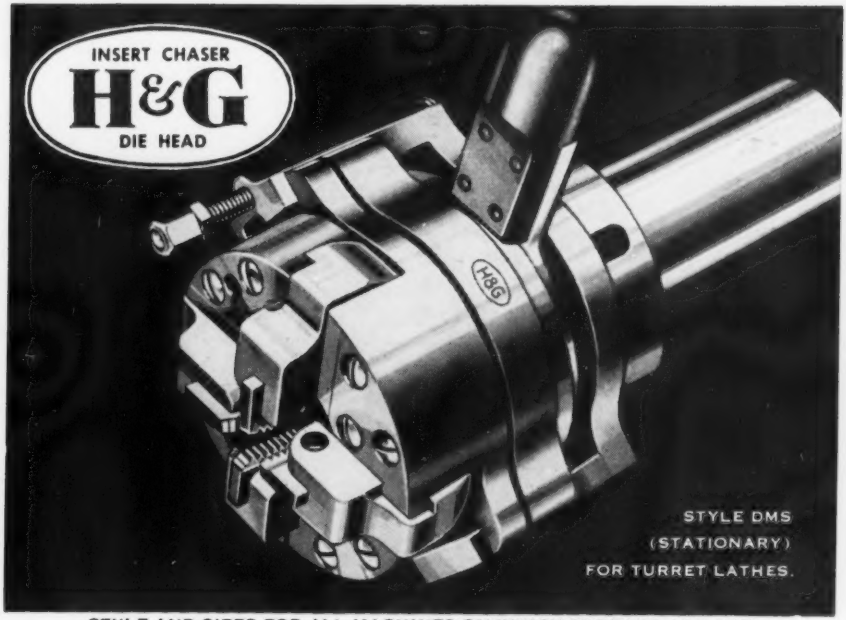
WRITE FOR KNURL BULLETIN

REED ROLLED THREAD DIE CO.

Specialists in Thread and Form Rolling Tools and Equipment

WORCESTER 1, MASSACHUSETTS, U. S. A. K-163

For more data circle 461 on Postpaid Card



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for less than $50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve.

"Unified and American Screw Thread Digest"
sent free on request.

THE EASTERN MACHINE SCREW CORPORATION

40-50 BARCLAY ST. • **NEW HAVEN, CONN.**

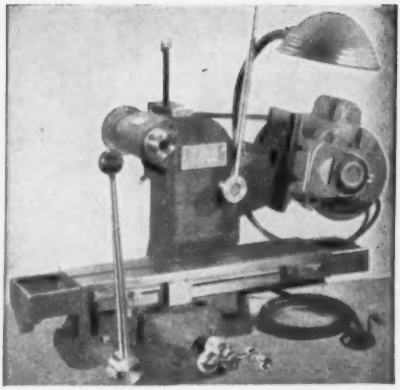
For more data circle 462 on Postpaid Card

will be noted, by a new construction design, wheel and index plate are now made as a one piece unit. This new design has several advantages. The index plate cannot become loose or out of alignment. The one unit construction increases the ruggedness of the wheels and gives greater uniformity in the heat treating.

For more data circle 94 on Postpaid Card

★ modern machine shop ★

HAND MILLER IS AVAILABLE IN THREE MODELS



Northern Illinois Machinists Hand Miller

The Model 422 Horizontal Bench Type Hand Milling Machine, recently announced by Northern Illinois Machinists, Crystal Lake Rd., McHenry, Ill., is equipped with hand levers for table and spindle movements. The saddle has a dial and lead screw. A hand lever is offered for the saddle, if so desired. The Model TR is equipped with lead screws at all positions. The



Commander

MULTI-TAPPER

TAP up to
8 HOLES at a TIME . . . in any pattern

- AUTOMATIC TAP REVERSAL
- FITS ANY DRILL PRESS
- PRECISE DEPTH CONTROL

MULTI-TAPPER simultaneously handles different tap sizes and pitches—can be set up for automatic or semi-automatic operation. Makes any drill press a production tapping tool.

Want a demonstration in your plant? Write us and we'll arrange it with your nearby Commander Distributor. Ask for your copy of the new Commander Production Tool Catalog.

Commander MFG. CO.
4224 W. KINZIE STREET • CHICAGO 24, ILLINOIS

For more data circle 463 on Postpaid Card

400 Standard Cleveland Punches from 5/32" to 1 1/2"



YOUR orders for any of these 400 standard punches will be filled promptly. Naturally they cost less than special punches. What's more, when you order Cleveland punches you're sure of getting quality tools backed by years of specialized experience. We're constantly experimenting with various steels and processes so that we can give you the very best.

Are your punching machines equipped to use standard Cleveland punches? If not, it will pay you to investigate the many advantages of standardization. For detailed information send for our new Catalog No. 12 today!



AA-6164

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES — FABRICATING TOOLS

City Foundry Division • Small Tool Department

E. 40th & St. Clair Avenue • Cleveland 14, Ohio

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • E. LANSING

For more data circle 464 on Postpaid Card

TR Vertical Model has a vertical head and is used for small toolroom work.

All three models have eight spindle speeds, ranging from 700 to 4,700 r.p.m. The manufacturer recommends a 1/3 h.p., 1,725 r.p.m. motor for the Models 422 and TR. A 1/4 h.p., 1,725 r.p.m. motor should be used with the Vertical TR.

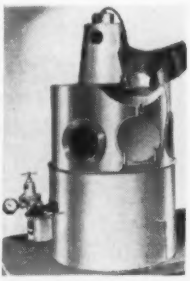
Table dimensions are 4 by 22 inches with 8 inches of travel. Crossfeed and spindle travel are 4½ inches. Vertical capacity is 6½ inches from the table to the center of the spindle on the horizontal models. The spindles are ground with a No. 7 B. and S. taper. They are mounted in double row ball bearings. All movements are dovetailed with a gib adjustment for wear. Each movement may be locked in any position.

For more data circle 95 on Postpaid Card

★ mms ★

WET BLAST HONER

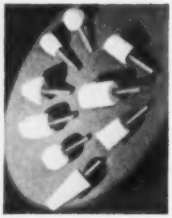
Tobin-Arp Manufacturing Co., 6400 Penn Ave., South, Minneapolis 23, Minn., recently announced the addition of a new wet blast honer to its Tamco line. Called the Liqui-



Tamco Liqui-Breez Wet Blast Honer

TICKLISH FINISHING JOB?
do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard — there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:





MICRO-FINISHING

Paramount Felt Bobs make ultra-fine finishing of surfaces quick, easy and economical.



DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.

NEW BOB ASSORTMENT KITS

K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at $10.95 (K-1) and $12.95 (K-2) they are far below the cost of buying bobs separately.

See your jobber or write for literature

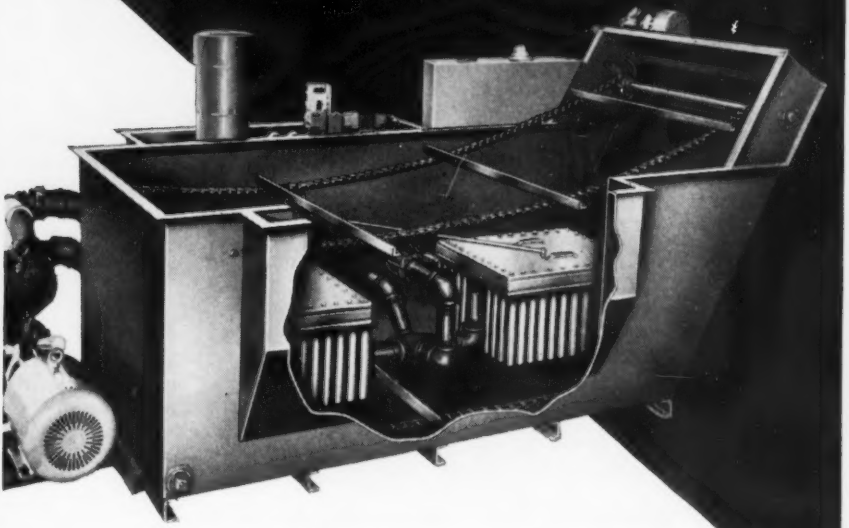
BACON FELT CO.
457 West Water St., Taunton, Mass.

JOBBER INQUIRIES INVITED

For more data circle 465 on Postpaid Card

for versatility in filtration

CFC Delpark FILTER-MATIC



CFC Delpark Filter-Matic gives constant vacuum filtration for all types of fluids such as coolants, cutting oils, rolling oils, and solvents.

To meet *individual* fluid characteristics and flow rate, you have a choice of Leaf-Type or Tubular Screen elements plus a variety of metal screen or natural fibre media.

Dual manifold design allows uninterrupted filtration — one manifold on filtering cycle while the other is on backwash or cleaning.

Pre-coat filter aids may be used to give absolute filtration.

Write for technical literature to Department. MM.

COMMERCIAL FILTERS CORPORATION
MELROSE—76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.

CFC FILTERS — Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.

For more data circle 466 on Postpaid Card

Breez, this wet blast honer has been designed to save resharpening time, cut machine down time and to produce high quality finish deburring. For honing all types of tungsten carbide and high speed steel cutting tools and drills, the operation of the machine requires an abrasive load of 5 pounds plus 3 pounds of water.

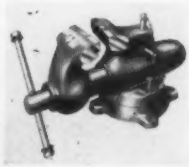
The Liqui-Breez Machine has a self-contained bench type cabinet, 36 inches in overall height, 18 inches in diameter with a working chamber 13 inches high, 18 inches in diameter and the loading door is 5¾ inches in diameter. It comes complete with factory installed rubber gauntlets and is operated by a handy foot pedal, with a specially designed viewing scope and shield to permit direct view of the work.

For more data circle 96 on Postpaid Card

★ mms ★

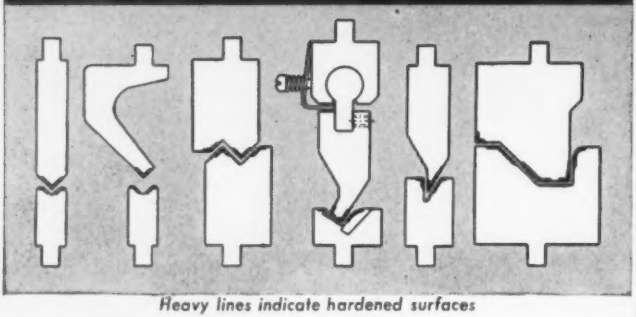
SWIVEL JAW VISE

Wilton Tool Manufacturing Co., Inc., Schiller Park, Ill., has developed a swivel jaw vise for clamping irregular or tapered workpieces. The back jaw of the vise is on a pivot. A pin holds it in place for straight clamping action. With the pin removed, the jaw can be pivoted



Wilton Swivel Jaw Vise

CHICAGO INDUCTION HARDENED PRESS BRAKE DIES



Heavy lines indicate hardened surfaces

for greater die life—
at no extra cost—
on any make press brake

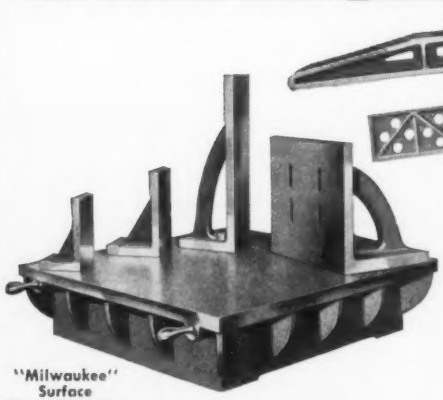
Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO induction-hardened dies for your next press brake job.

Steel Bending Brakes For Over Fifty Years 4901

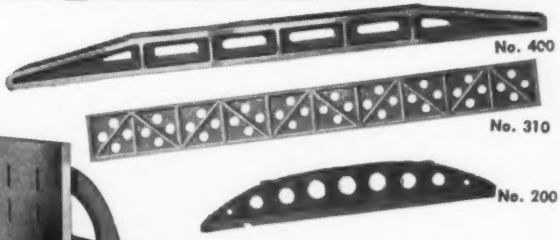
DREIS & KRUMP MANUFACTURING COMPANY
CHICAGO STEEL BENDING BRAKES BOX AND PAN BRAKES PRESS BRAKES
7418 S. Loomis Blvd., Chicago 36, Illinois

For more data circle 467 on Postpaid Card

MILWAUKEE *Precision* EQUIPMENT



"Milwaukee" Surface Plates & Angles



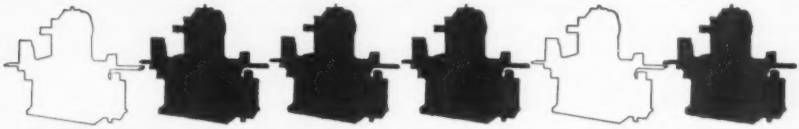
True Dimensional Accuracy —

— in measuring and checking your products is assured when you rely on "MILWAUKEE" Surface Plates, Angles, Parallels, & Straight Edges. Made from highest grade semi-steel. Write for Catalog.

J. C. BUSCH COMPANY *Engineers & Machinists* SINCE 1907

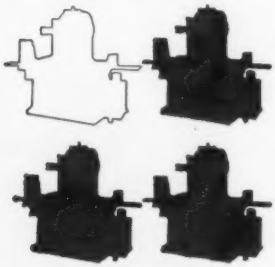
126 E. PITTSBURGH AVE.
MILWAUKEE 4, WISCONSIN

For more data circle 468 on Postpaid Card



SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS...



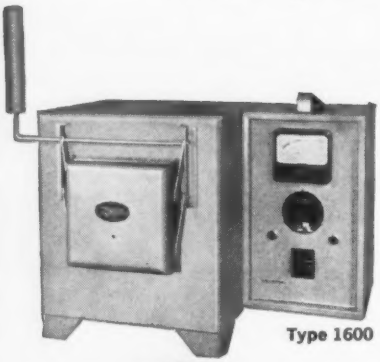
— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book that tells you why.

GALLMEYER & LIVINGSTON CO.
408 Straight Ave., S.W. Grand Rapids, Michigan

GALLMEYER & LIVINGSTON

the "do-it-yourself" heat-treat furnace that keeps growing in demand



Type 1600

SAVES TIME, CUTS COSTS

No wonder so many shops are installing this popular furnace today and eliminating "farming out" problems. With a versatile TEMCO bench unit right in your own shop you can heat-treat tools, dies, parts, etc. **exactly** when needed! No downtime while waiting for outside services to pick up and deliver your work. **Save hours** on jobs. **Cut costs** with economical to own and operate TEMCO furnaces. Easy to hook up, easy to use! (Type 1600 shown with TEMCOMETER-type controller in cabinet assembly.) TEMCO line includes 18 models with chamber sizes from 4" x 3¾" x 4¼" to 10" x 9½" x 22". $65 to $973.25 complete with controls.

Write for new TEMCO-THERMOLYNE Catalog and name of nearest dealer.

TEMCO®

ELECTRIC FURNACES

Thermo Electric Mfg. Co.

488 Huff Street, Dubuque, Iowa

For more data circle 470 on Postpaid Card

new shop equipment . . .

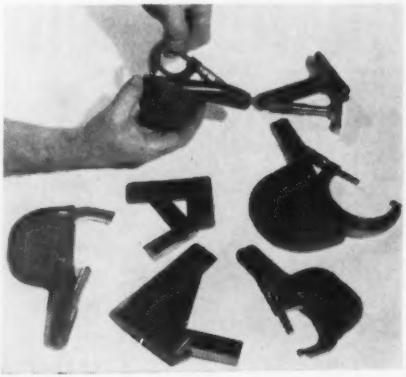
right or left to lock angular workpieces securely in place. When the pin is reinserted, it holds the rear jaw accurately parallel to the front jaw. A horizontal relief hole, on the side of the vise, makes it easy to remove the vertical pin. By inserting a drift pin in this hole, the vertical taper pin can easily be unseated and removed. Both the tapered vertical pin and the drift pin are included with the vise. A strong chain connects them. This makes them virtually loss proof, because one of the two pins always remains on the vise.

For more data circle 97 on Postpaid Card

★ modern machine shop ★

PROTECTORS FOR PRECISION INSTRUMENTS

A complete line of protective coverings for all makes of standard precision instruments, tools and gages, is now being manufactured and marketed under the name of Micro-Safe by Micro-Safe Co., 200 Oakview Drive, Kettering 29, Ohio. The protectors are precision molded vinly plastic covers,



Various Micro-Safe Precision Tool Cases

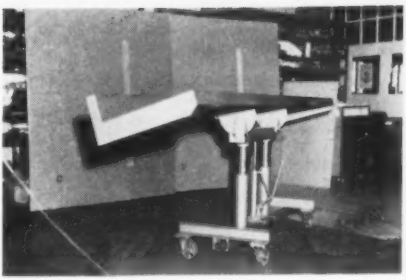
⅛ inch in thickness, and are shaped to closely fit the contour of the individual tool.

Micro-Safe Protectors have been designed to provide complete protection against damage due to rough handling, dust, dirt, oil, corrosive liquids or vapors and, at the same time, are easy to carry, store and identify. They are said to eliminate completely the need for flimsy, bulky hinged boxes that break easily and give little or no protection.

Micro-Safe Protectors can be made to fit special cutting tools, knives, welding torches, cutting tips and so on. They are available for all makes and sizes of micrometers, including those made by Brown and Sharpe, L. S. Starrett, Lufkin, Federal, Ames, Tubular and so on.

All protectors are available in either red or green.

For more data circle 98 on Postpaid Card



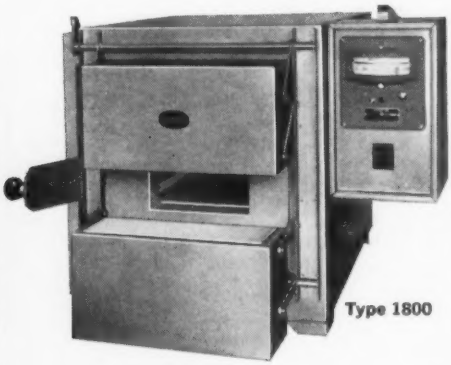
Lexco Hydraulic Strip Stock Handler

HYDRAULIC STRIP STOCK HANDLER

Lexco Engineering and Manufacturing Corp., 20 West Chestnut St., Souderton, Pa., has introduced its hydraulic strip stock handler.

This handler has a capacity of 1,000 pounds, a 20 inch wide by 8 or 10 foot long top with a 5¾ inch high back flange. The top is adjustable

the new BIG bench-type furnace for heavy production heat-treating



Type 1800

An all-new TEMCO electric furnace specifically designed to let you heat-treat more **and bigger** parts in a bench-type unit. **Larger chamber size** . . . 10″ W, 9½″ H, 22″ D. **Higher temperature range** . . . continuous up to 2000° and 2300° F (1095° and 1260° C) . . . **handles most high-speed steels.**
This new Type 1800 TEMCO furnace features a close-sealing sectional door with patented lever suspension to provide limited or full access as desired. Reinforced welded steel case...7½″ firebrick and backup insulation. Choice of single or three-phase models for 208, 230 or 460 volts. Available with or without controls. $570 to $682 furnace only.

Write for new TEMCO-THERMOLYNE Catalog and name of nearest dealer.

TEMCO®

ELECTRIC FURNACES
Thermo Electric Mfg. Co.
488 Huff Street, Dubuque, Iowa

For more data circle 471 on Postpaid Card

from horizontal to a 30 degree angle to suit inclinable punch presses.

The handler operates from a low of 32 inches to a high of 43 inches and has a hand operated pump and four 5 inch steel swivel casters.

It is also available with Hard-Tred composition wheels, floor locks and a foot operated pump.

For more data circle 99 on Postpaid Card

BANDSAW BLADE DISPENSER

The development of a dispenser for bandsaw blades has been announced by Clemson Brothers, Inc., Middletown, New York.

Known as the Reel-Pac, it is a free running permanent reel of non-breakable material, prepackaged in individual corrugated cartons for reshipment. The prepack cartons are clearly marked as to width and type. The 9¼ inch diameter dispenser holds 100 feet of blade without the usual container distortion caused by spring tension. The strength of the Reel-Pac eliminates blade snarling and it is easy to store and use—simply pull off the amount needed and then cut.

Three blade types are available in the dispenser in widths up to ½ inch. The gored tooth blade, used for non-ferrous metals, plastics, wood and large easily machined ferrous sections where heavy feeding pressure is nec-



Reel-Pac Dispenser for bandsaw blades

Precise-Uniform

Gillen TAPER PINS

¼" per foot

For Precision Assembling •
Available in All Metals •
Complete Range of Sizes •
Rust Resistant Coating •

Standard Turned Pins •
Centerless Ground Pins •
Threaded End Pins •

Immediate Delivery •



Diameters From 7/0 to No. 14

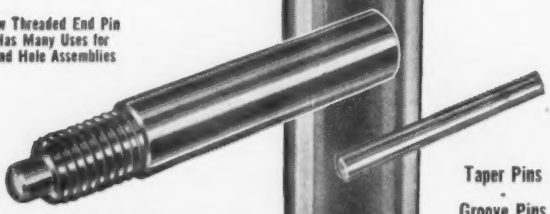
•

Up to 13" Lengths

•

Write For TAPER PIN Price List and Samples

New Threaded End Pin Has Many Uses for Blind Hole Assemblies



Taper Pins
•
Groove Pins
•
Machine Keys
•
Woodruff Keys

John Gillen Company

Keying and Pinning Devices

2564 South 50th Avenue • Cicero 50, Illinois

A Subsidiary of Standard Railway Equipment Manufacturing Company

For more data circle 472 on Postpaid Card

INVESTIGATE GISHOLT FACTORY-REBUILT MACHINES

NEW MACHINE GUARANTEE

phone or write for quotations and details

GISHOLT MACHINE COMPANY

1219 E. Washington Ave., Madison 10, Wis.

Phone: Alpine 6-9081, Ext. 222

For more data circle 473 on Postpaid Card

DEKA BORE

OFFSET BORING HEADS



UNPARALLED

- ACCURACY
- RIGIDITY
- SIMPLICITY
- DURABILITY

REPEAT TO .0001" IN 30 SECONDS WITHOUT BACKLASH! CAN BE ADAPTED TO FIT ANY MACHINE

100% GUARANTEED! WRITE FOR CATALOG!

PRECISION

PRECISION TOOL & MFG. CO. of ILLINOIS

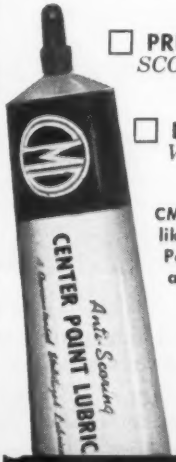
1305 SOUTH LARAMIE AVE., CICERO 50, ILL.

For more data circle 474 on Postpaid Card

What is your CMD

LUBRICATING PROBLEM?

- ☐ **LATHE CENTER LUBRICATION** *SCORING-GALLING*
- ☐ **GRINDING CENTERS** *LUBRICANT WASHOUT*
- ☐ **DRAWING** *SCORE MARKS-DIE WEAR*
- ☐ **STEADY RESTS** *WORK PIECE DAMAGE*
- ☐ **PRESS FITS** *SCORING-SEIZING*
- ☐ **DIE POSTS** *WEAR-FREEZING*



CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

CHECK AND SEND IN FOR SAMPLE

Anti-Scoring Lubricant

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

1910 West 46th Street, Chicago 9, Illinois

For more data circle 475 on Postpaid Card

essary; the flexible back skip tooth, for cutting non-ferrous metals, aluminum, magnesium, soft brass, bronze, plastics and wood; and the outline bandsaw blade, especially designed for contour sawing of irregular shapes.

For more data circle 100 on Postpaid Card

BRAND NEW NAME PLATE MARKER

SCHMIDT PNEUMATIC PLATE STAMPER

- Power operated
- Flexible
- Designed for safety
- Simple operation
- Eliminates fatigue



This GTS designed and built machine guarantees that your plates will be marked with perfect precision: alignment, spacing and depth of characters.

Get all the facts about the GTS Pneumatic Plate Stamper . . . Write for complete information today.

IF IT'S WORTH MAKING, IT'S WORTH MARKING.

GEO. T. SCHMIDT, INC.
1806 West Belle Plaine Avenue
Chicago 13, Illinois

For more data circle 476 on Postpaid Card

NIBBLER

A new machine for cutting metal has been introduced by the Fenway Machine Co., Edgemont and Clementine Sts., Philadelphia 34, Pa. This Fenway Nibbler will be most valuable to the aluminum and steel industries, but even more so to the chemical industry. It will not only cut all types of corrugated metals, but it will also cut these metals, should they have any kind of asbestos or pitch coatings, without clogging the machine.

Injury, due to jagged edges, is eliminated since the nibbler cut leaves a finished, smooth edge; it is impossible for an operator's finger to come into contact with the punch because the punch is set well back in the nose block; the cut pieces of metal drop directly down and are not hurled or flipped at a tangent, thus reducing chances of eye injury. The nibbler comes in



Fenway Nibbler is made in five models

Save Time, Money
and Labor with

DURO DRILL PRESSES

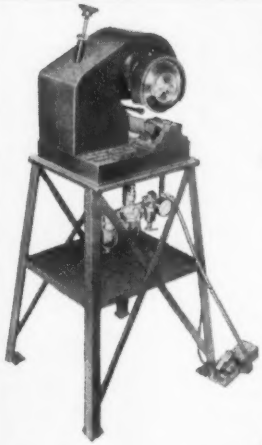


Duro Drill Presses are precision units, offering *extra* capacity, *extra* features at no extra cost! It is the only line that permits "custom selection" from the largest array of models in the power tool field. The Duro Line includes single and multiple units, in 15½" and 18" sizes, with or without production tables and bases, with optional foot feeds, in bench or floor models. Each unit has sealed-for-life ball bearings, precision bored bearing seats, ground alloy spindles, vibration free head castings, sturdy cast hinged belt and pulley guards; adjustable feed tension, plus many others.

Write for FREE Power Tool Catalog

DURO Metal Products Co.
2682 N. Kildare Avenue, Chicago, Illinois

For more data circle 477 on Postpaid Card



PAYS for ITSELF

NO MATERIAL LOSS

Continental **PIPE AND TUBE**
ROTARY CUT-OFF MACHINE

It zips right through tubes from ⅜" to 1¼" O.D., from light gauge to 16-gauge wall thicknesses. Adjustable table with 5 Dual-Roller Forks. *Also Cut-Off Machines up to 12" diam., air or hand-operated.*

cuts up to 2,000 tubes per hour

Continental machine co.
SINCE 1919
2345 W. NELSON ST. • CHICAGO 18, ILL.

For more data circle 478 on Postpaid Card

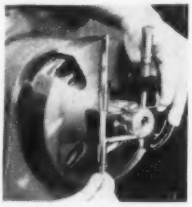
air powered and electric models. The Fenway Nibbler is made in five models and can be vise mounted for bench work or used as a portable, as it weighs only 13 pounds. The overall length is 10 inches and the small, compact 1¼ h.p. motor is capable of delivering a 2 ton punch.

For more data circle 101 on Postpaid Card

THREAD MEASURING WIRE HOLDER

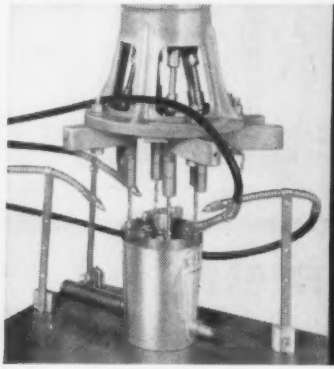
Flynn Manufacturing Co., 133 Flowerdale Ave., Detroit 20, Mich., is now offering a device to hold the three measuring wires over the thread for miking. This instrument is called the Third Hand Thread Measuring Wire Holder.

The Third Hand eliminates the juggling and the make shift. A simple device, it consists of a stainless steel bar with two sliding elements which adjust up and down along the bar, under spring tension, to accommodate different sized pieces of work. Each element has a resilient pad which holds the measuring wires firmly. The elements hold the wires parallel to each other as they are fitted over the thread to permit easy miking. The elements slide easily, firmly into place under precise spring tension. No set screws and no adjustments are re-



Thread Measuring Wire Holder

Whatever your dry machining process



Economical KETT "Mystic-Lube" Mist Coolant Generator

GIVES YOU . . .

- Faster Operating Speeds
- Longer Tool Life
- Deeper Cuts
- Better Finishes
- Lower Costs
- Flexibility
- Portability
- Dependability

Mist dissipates in the air—cools by refrigeration principle. No special coolants, no moving parts—operates off any air line. Compact, all-in-one unit, one and four gallon size, has features non-available in many higher priced models. Quality designed for quick transfer, ease of maintenance.

KETT

WRITE FOR LITERATURE AND PRICE LIST

THE KETT TOOL CO.

5048 Madison Rd. Cincinnati 27, Ohio

For more data circle 479 on Postpaid Card

quired. The Third Hand can be either held in the hand for stationary work in a machine or mounted on a pedestal and the work brought to it.

The toolmaker, who normally relies on his skilled feel to determine when the wires are parallel under the micrometer, finds that he loses nothing of his touch with the Third Hand. The resilent pads, holding the measuring wires, enable him to adjust the wires to feel, as well as mechanically and visually.

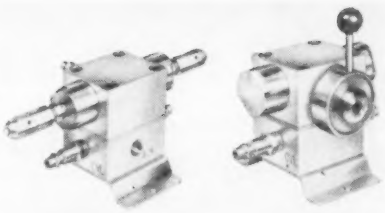
For more data circle 102 on Postpaid Card

★ mms ★

FOUR WAY AIR VALVES

Mead Specialties Co., Dept. I-42, 4114 North Knox Ave., Chicago 41, Ill., has introduced Four Way Inching Air Valves, which will advance the ram of a double acting air cylinder to any desired point and stop it dead at that point. It will stay there, without creeping. For such applications as hoists, assembly tables and many others, these valves will solve many problems that were hitherto reserved for hydraulics.

For the BL-601 Valve, only a feather-weight push is needed to move



Mead Four Way Inching Air Valves— (Left) the BL-600 and (right) the BL-601



The Aristocrat Line of

MARSHALL

GROUND FLAT STOCK

OILcrat

AIRcrat

MarshalLCrat

OVER 2000 SIZES

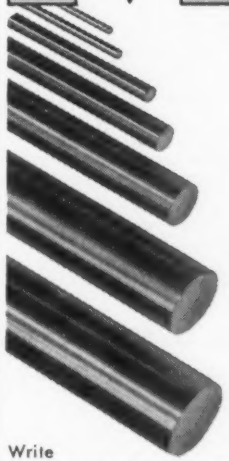
ALSO

OIL HARDENING (SAE 01)

WATER HARDENING (COMMERCIAL)

DRILL ROD

DOWEL PINS





Write for Name of Nearest Dealer

MARSHALL STEEL Company

BOX 108-M, LAGRANGE, ILL.

Write for Catalog

For more data circle 480 on Postpaid Card

the lever 45 degrees left or right, the full arc of its travel. One position advances the cylinder ram and the other retracts the ram, but stops it instantly in the median position, trapping the air in an air cylinder and preventing further movement, even though the air supply to the valve is disconnected.

The BL-600 works the same as the BL-601, but operates with two small limit valves, rather than the lever. Depressing the button on one side moves the cylinder ram in one direction, and depressing the other button moves it in the opposite direction, stopping when a button is released.

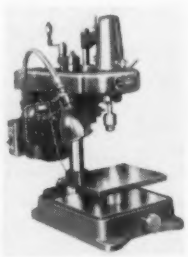
For more data circle 103 on Postpaid Card

★ modern machine shop ★

SENSITIVE DRILLING MACHINE

A sensitive drilling machine, engineered and manufactured to strict specifications for the precision production of small holes in any material, is being marketed by High Speed Hammer Co., 315 Norton St., Rochester 21, New York.

This Model AF-7B drill has a capacity of No. 0-5/16 inch diameter drills. Among its features is its ability to drill to the center of an 11¾ inch circle. Other features include a vertical travel of the head of 8



High Speed AF-7B Drilling Machine



Users of Adjustable Drill Heads are unusually accurate in anticipating profit pictures —they regularly figure lower and *more dependable costs.* That's because these high-quality heads—priced right to start with—usually cost less to maintain, less to operate.

The U-1 Head shown has 8 drivers, ¼" drilling capacity in cast iron, 6" diameter drilling area. With 2 spindles and Erickson chucks, it costs only $260.

And that's because ALL U. S. Heads of this type have these plus features:

SHAVED GEARS
SPECIAL UNIVERSALS
ALUMINUM BODY CASTING
GREATER BEARING AREA
QUICK CHANGEOVER
SLIP SPINDLE PLATE

Write for catalog AD-57. Immediate delivery on most standard sizes.

US DRILL HEAD
Adjustable and Fixed Center Multiple Drilling Heads
Individual Lead Screw Multiple Tapping Heads
UNITED STATES DRILL HEAD CO.
BURNS STREET • CINCINNATI 4, OHIO

For more data circle 481 on Postpaid Card

inches; head can be moved through a complete circle, if desired; spindle travel is 2⅜ inches; maximum distance, chuck to base, is 10⅞ inches; maximum distance, chuck to round table, is 8¾ inches; standard equipment includes a 5½ inch diameter round table. A 7 by 9 inch rectangular table, which fits over the round table, is available.

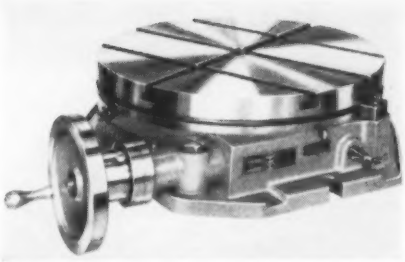
Speeds of this machine are 750, 1,500, 3,000 and 6,000 r.p.m. A molded endless belt eliminates belt stretching. The size of the machine is 11 inches wide by 24½ inches deep by 25 inches high overall. The motor is ¼ h.p., 110 volts, single phase, 60 cycle, a.c. standard, with cord, switch and plug.

For more data circle 104 on Postpaid Card

★ mms ★

ROTARY TABLE

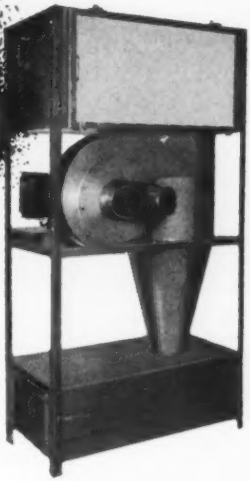
Troyke Manufacturing Co., 11296 Orchard St., Cincinnati 41 (Sharonville), Ohio, has announced that its line of rotary tables has been redesigned with additional features and greater accuracy for performing a variety of operations, such as cutting segments of circles and circular slots,



Troyke Rotary Table has new features

EFFICIENT–LOW COST

Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP®
STOPS DUST

37 STANDARD MODELS TO CHOOSE FROM

• *READY TO USE*

Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY
1398 E. CHURCH ST. • ADRIAN, MICHIGAN

For more data circle 482 on Postpaid Card

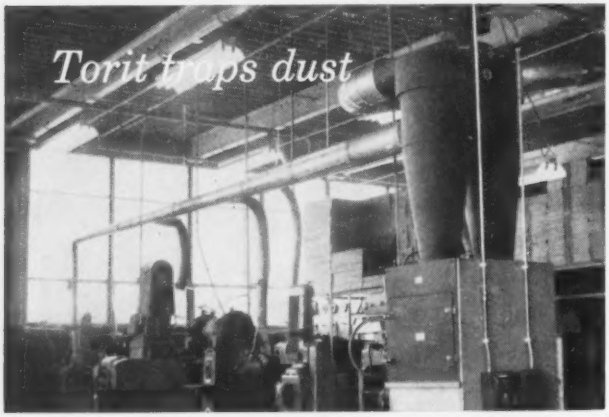
milling clutch teeth, locating angularly spaced holes or slots and cutting irregular contours. Some of the features are larger diameter, easy to read dials which are accurately graduated in one minute increments; one piece worm shafts; enclosed base to prevent chips, dust or dirt from entering; sturdier brackets; precision ground turntables, accurately graduated in one degree increments; coolant troughs on larger models; and easy to follow index plates. All worms and worm wheels are cut on special single purpose machines of unusual accuracy and each rotary table is checked with an auto-collimator. The total guaranteed accuracy is 60 seconds or less. Troyke Rotary Tables are available in six diameters, ranging from 9 to 25 inches and in eight different models.

For more data circle 105 on Postpaid Card

★ mms ★

MACHINABLE CARBIDE ARBORS

The application of Ferro-Tic, the new machinable cemented carbide, to spring coiling arbors has been announced by the Sintercast Corporation of America, 134 Woodworth Ave., Yonkers, N. Y. The manufacturer claims that, in preliminary tests, Ferro-Tic coiling and cut-off arbors for winding 0.218 inch diameter carbon steel wire into valve springs showed a threefold increase in the average spring production over previously used tungsten carbide.



Six machines protected from dust by Torit for **$666.15**

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just $666.15!

After one year's operation, Mohr Lino Saw says this about their *low-cost* Torit installation: "The Torit installation has kept our shop *cleaner*, our operators *happy*, and *protected vital* machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust *at its source* with a completely *self contained* and *portable* Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.
Dept. 703, 311 Walnut Street, St. Paul 2, Minn.

For more data circle 483 on Postpaid Card

CAMS

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring** and **Thread Grinding** facilities as well as modern **Cam Milling** and **Cam Grinding** equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC
23-16 44th Road Long Island City 1, N. Y.

For more data circle 484 on Postpaid Card

Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 1/8" to 3/4" U.S.S. Inexpensive — Last for years.



Write for Circular
NIELSEN TOOL & DIE COMPANY
17360 Lahser Road, room 202
Detroit 19, Michigan

For more data circle 485 on Postpaid Card

LINLEY RIVETERS



spin rivets noiselessly at low cost

●

Speed your riveting production with Linley Noiseless Riveters. We'll give you, without obligation, cost and time estimates of doing it the Linley way if you'll send us samples of parts to be riveted.

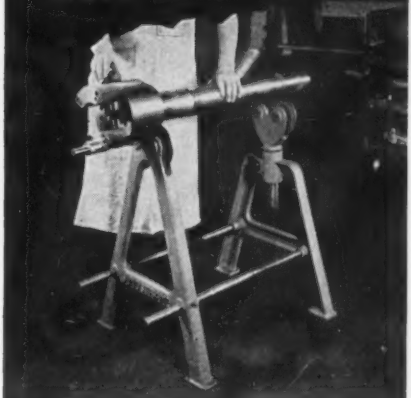
Linley Riveters will do rivets up to 3/8" in diameter in iron and cold rolled steel; larger sizes in brass, aluminum, etc.

Send for Bulletin R Today.

LINLEY BROTHERS CO.
Also Builders of JIG BORERS
671 State St. Ext., Bridgeport 1, Conn.

For more data circle 486 on Postpaid Card

Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES

Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

FREE DATA



SUNDSTRAND

You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 596.

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

For more data circle 487 on Postpaid Card



ENCO

Self-Indexing HEXTURRET

Convert your lathes for turret work this quick, easy way. ENCO HEXTURRET gives you the *accuracy*, *rigidity* and *speed* you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

ENCO Mfg. Co.
4520 W. Fullerton
Chicago 39

PRECISION ENCO ECONOMY

ENCO Manufacturing Co.
4520 W. Fullerton,
Chicago 39. Dept. 1108

Please send catalog #53 and full details of ENCO HEXTURRETS.

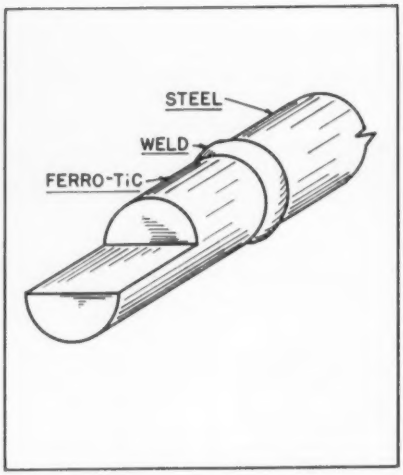
Name_____

Firm_____

Address_____

For more data circle 488 on Postpaid Card

new shop equipment . . .



This illustration shows a Ferro-Tic Arbor

Butt welding of the Ferro-Tic to the steel arbor shank entirely eliminated the possibility of braze failure of ten encountered with tungsten carbide tipped arbors. Since Ferro-Tic is readily machined in the annealed state, required fabrication, that is sawing, turning, drilling or aluminum oxide wheel grinding, is completed prior to oil quench hardening. Once hardened, the Ferro-Tic arbor tip is extremely resistant to the sever abrasive action inherent in the coiling operation. Further cost savings are achieved by reannealing the used Ferro-Tic arbors and reworking them to smaller sizes.

For more data circle 106 on Postpaid Card

★ modern machine shop ★

PROFILING MACHINE

The Pruitt Profiler P-500, recently announced by Tool-Lab, Inc., Escon-

dido, Calif., is claimed to represent an important new concept in the fields of profile grinding and routing. The company claims that slow, costly and inaccurate methods of hand finishing are eliminated by the micro-feed guide button that affords unusual precision, high production and low cost. With this profiling machine, such operations as template making, reproduction of parts from templates and die sharpening, become both rapid and semi-automatic.

The Pruitt Profiler P-500 has a ½ h.p. direct drive motor with continuous, precise speed adjustment from 100 to 45,000 r.p.m., which allows grinding, milling and routing of metals, wood, plastics, glass or rubber with equal ease. It is claimed that there is no vibration at any speed, which means greater precision and finer finishes, while the unencumbered work surface allows greater flexibility in handling large workpieces.

For more data circle 107 on Postpaid Card



Profiler with micro-feed guide button

Great Buys from

VICTOR

Extra Long, Straight Shank

High Speed Drills



12" OA, 9" FLUTE

SIZE	PRICE	SIZE	PRICE
1/8	1.65	27/64	3.30
9/64	1.75	7/16	3.30
5/32	1.75	29/64	3.60
11/64	1.85	15/32	3.60
3/16	1.85	31/64	3.60
13/64	1.95	1/2	3.60
7/32	1.95	33/64	4.20
15/64	2.05	17/32	4.20
1/4	2.05	35/64	4.50
17/64	2.15	9/16	4.50
9/32	2.15	37/64	4.75
19/64	2.25	19/32	4.75
5/16	2.25	39/64	5.00
21/64	2.50	5/8	5.00
11/32	2.50	21/32	5.40
23/64	2.75	11/16	5.80
3/8	2.75	23/32	6.25
25/64	3.05	3/4	6.75
13/32	3.05		

18" OA, 13½"-14" FLUTE

SIZE	PRICE	SIZE	PRICE
3/16	4.00	9/16	8.75
7/32	4.10	19/32	9.50
1/4	4.10	5/8	10.00
9/32	4.75	41/64	11.00
5/16	4.75	21/32	11.00
11/32	5.25	43/64	12.00
3/8	5.25	11/16	12.00
13/32	6.00	45/64	13.00
7/16	6.00	23/32	13.00
15/32	6.50	47/64	14.00
1/2	7.00	3/4	14.00
17/32	8.50		

Order Today

IMMEDIATE DELIVERY!

VICTOR

MACHINERY EXCHANGE INC.

Dealers in Tool Room Equipment

251 CENTRE STREET, DEPT. B

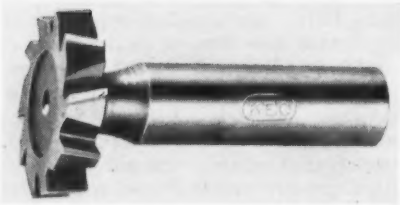
Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 489 on Postpaid Card

STAGGERED TOOTH WOODRUFF KEYSEAT CUTTERS

All standard sizes, from No. 201 to letter G, are now available from stock from Keo Cutters, Inc., 25040 Easy St., Warren, Michigan.

The complete set, from ¼ inch in diameter and 1/16 inch thickness to 1½ inch in diameter and ⅜ inch thickness, may be obtained in a special hardwood box for use as a tool crib set. All are of high speed steel with ½ inch shank and are available for immediate delivery from stock.



Keo Staggered Tooth Woodruff Cutter

For more data circle 108 on Postpaid Card

★ mms ★



They are made to provide smooth, more efficient transmission of power and are available from stock in 13 sizes with bored or solid hubs ranging from .375″ to 4.000″. Special bores, bores with keyways or setscrews are available upon special order.

Joints with hub diameters of .750″ and larger have a self-closing snap ball oiler while the small pin is held in place with a self-locking snap ring.

Send today for Bulletin No. 527 describing the full line of ASG Universal Joints available from your nearest distributor.

AMERICAN STOCK GEAR DIVISION
PERFECTION GEAR COMPANY, HARVEY, ILL., U.S.A.

For more data circle 490 on Postpaid Card

15 SPINDLE DRILLING AND TAPPING HEAD

The Model 8-12 Multi-Drill, recently introduced by the Commander Manufacturing Co., 4224 West Kinzie St., Chicago 24, Ill., may be equipped with up to 15 gear driven spindles for multiple drilling and tapping over a maximum area of 25½ by 21½ inches. Universally adjustable locating arms and heavy duty universal joints used in all spindles permit any desired hole pat-

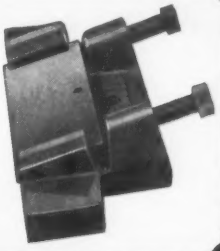
QUICK SURE GRIP...

FOR ANY WORK ON ANY MACHINE TABLE

HART *DIVIDED*
MACHINE VISE JAWS

Write for circular

WALTER W. FIELD & SON, INC.
39-51 HAYWARD STREET, CAMBRIDGE 42, MASS.



For more data circle 491 on Postpaid Card



DYKEM STEEL BLUE®

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

For more data circle 492 on Postpaid Card

TYPES TO FIT ANY MACHINE USED FOR TAPPING OR REAMING



PROMPT DELIVERY

NO NEED FOR EXACT ALIGNMENT!

When making set-ups for tapping and reaming jobs, the work need not be aligned with the spindle to a high degree of exactness if you use a Ziegler Floating Tool Holder rather than an ordinary tool holder.

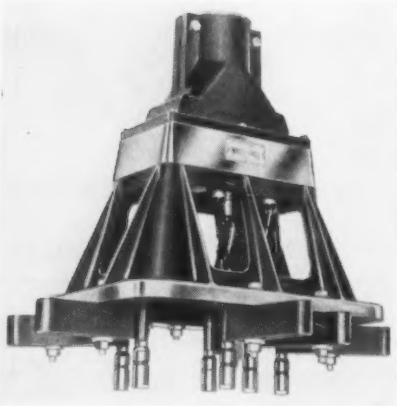
The reason is that the Ziegler automatically compensates for inaccuracies in alignment even through they may amount to as much as 1/16" (on the diameter).

The Ziegler Holder always floats freely, without friction or cramping, even under the severest tool-driving strains, taking any and all end-thrusts. Try it and see how much superior it is to any holder that you have ever used.

Write For Catalog

W. M. ZIEGLER TOOL CO.
roller drive floating tool-holders
13566 Auburn • Detroit 23, Michigan

For more data circle 493 on Postpaid Card



The Commander Model 8-12 Multi-Drill

tern adjustments within the working area of the unit. This Multi-Drill will fit any drill press. Any number of spindles up to 15 may be operated, and are driven by either high or low speed gear sets. Low speed is drill press speed and high speed is twice drill press speed. Quick, easy driven shaft speed changes may be made from low to high speed or vice-versa. Maximum capacity of the unit is ½ inch in steel and ¾ inch in cast iron.

For more data circle 109 on Postpaid Card

★ modern machine shop ★

TROUGH VISE OFFERS BIG OPENING CAPACITY

A line of trough vises offers big opening capacity for accurate machining of rough or finished workpieces. Product of The Skinner Chuck Co., Dept. 17, New Britain, Conn., the vise comes in five sizes—4, 5, 6, 7

DRILL HARDENED STEELS WITHOUT ANNEALING —



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon - high chrome steels of any degree of hardness. "HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly. *Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" Drills are cutting costs in thousands of plants.*



BLACK DRILL COMPANY, INC.
1372 East 222nd Street • Cleveland 17, Ohio

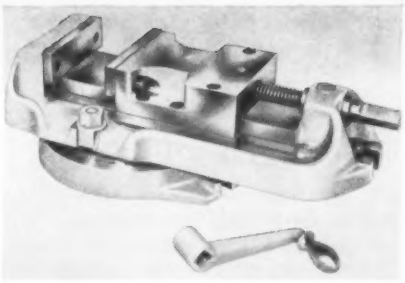
YOU HARDEN IT — WE'LL DRILL IT WITH — **"HARDSTEEL"**

For more data circle 494 on Postpaid Card

and 8 inch—and the opening capacity of each vise is the same as the width of the jaws. Extra rigidity has been built into the vises by means of center holddown screws, "square lock" way construction and wide table mountings.

The rugged, precision machined jaws ride across a smooth, unslotted body that keeps chips from getting under the movable jaws. Deep coolant troughs effectively return all coolant to the machine table.

For more data circle 110 on Postpaid Card

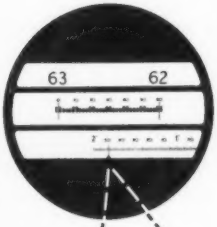


Skinner Trough Vise comes in five sizes

BENTLEY

10 YEARS OF DEPENDABLE SERVICE TO INDUSTRY

when one second is vital . . .

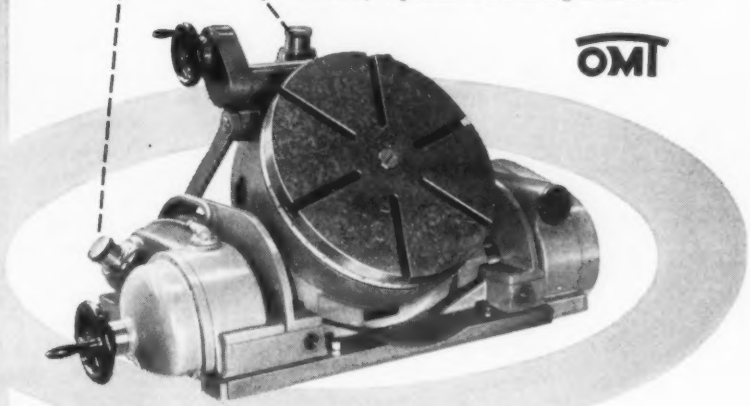


In inspection or production of compound angles, only the NEW O.M.T. 12" and 16" fully optical rotary and inclinable table offers direct scale readings to one second of arc for both movements. Twin eyepiece facilitates reading of rotary scale in elevated position.

Choose from a range of 9 hand and power operated tables from 10" to 30".

Mfd. by Optical Measuring Tools Ltd.

OMT



Write for FREE illustrated brochure and prices.

BENTLEY INDUSTRIAL CORP.

41 East 42nd St., Dept. E-10, New York 17, N. Y.

For more data circle 495 on Postpaid Card

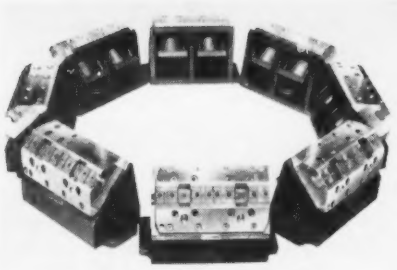
new shop equipment . . .

DUAL CHUCKING, CYLINDER OPERATED HOLDING FIXTURE

A dual chucking, cylinder operated holding fixture, especially suitable for use on high output automated production equipment, has been announced by the S-P Manufacturing Corp., Solon, Ohio.

Designed to be used individually or mounted in groups on a rotating work table and to provide simultaneous chucking of two identical parts, the fixture features clamping jaws set at a 45 degree angle to permit both horizontal and vertical machining of the workpiece without rechucking.

These dual chucking fixtures, which are hydraulically actuated, require 200 p.s.i. working pressure. Blank jaws supplied can be machined to suit workpiece configuration. Maximum jaw travel is 5/16 inch. Built in chip covers are furnished to keep jaw ways free of chips.



S-P Dual Chucking, Cylinder Operated Holding Fixture is suited for multiple application on fixed table or indexing machine

For more data circle 111 on Postpaid Card

He works better for he SEES BETTER®



For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER — the new 3-D binocular magnifier with matched prismatic lenses. It provides needle-sharp vision—*greatly magnified* and in *third dimension*.

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eye glasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only $10.50. Immediate delivery. Or write for illustrated folder.

MAGNI-FOCUSER the 3-D Magnifier that speeds production and leaves both hands free to work

EDROY PRODUCTS CO., Dept. T, 480 Lexington Ave., New York 17, N. Y.

For more data circle 496 on Postpaid Card



The HEIMANN MAGNETIC

CHIP REMOVER

THIS HAND IS IN THE CHIPS! Yes, and the chips are *not* in your eyes or hair or ways of machines. The Heimann Magnetic Chip Remover gets chips out of blind holes rapidly, cleanly, safely. It's a lastingly efficient, permanent magnet in a knurled aluminum holder. Send it in after chips and it comes out covered with them.

YOU CAN'T AFFORD to be without it! A natural for your tool box or crib. Made 1/8" to 1/2" sizes, at a price to attract. Write now for circular.

HEIMANN MFG. CO.,
URBANA, OHIO

For more data circle 497 on Postpaid Card

BRUSH TOP CANS
For Layout Blue!



HANDY, ELLISCO BRUSH TOP CANS MAKE IT EASIER FOR YOU TO APPLY AND STORE LAYOUT BLUE. BRUSH KEEPS MOIST IN CAN. CONTENTS WON'T DRY OUT 3 OZ. TO 1 QT. CAPACITIES. GET DETAILS AND BULLETIN.

George D. Ellis & Sons, Inc.
4024 N. American St., Philadelphia 40, Pa.

For more data circle 498 on Postpaid Card

CAM MILLING **JIG** BORING



A SPECIALIZED CAM MILLING SERVICE.
JIG BORING
... SPOT WELDING
.. CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO. **55-C**

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

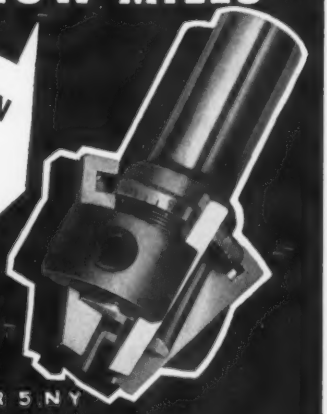
For more data circle 499 on Postpaid Card

KUTMORE
ADJUSTABLE
HOLLOW MILLS

- ANY COMBINATION of ... Turning ... Tapering ... Facing ... Chamfering ... Trepanning in ONE PASS.
- Exclusive MICROMETER Adjustment Feature For Rapid Set-Up.
- Cutting Capacities From 1/32" to 2" Diameter in Standard Stock Immediate Delivery.

WRITE FOR CATALOG 20-MM

PRECISION STARTS HERE:



CARL WIRTH & SON, INC.
1625 CLINTON AVE. NO. ROCHESTER 5 NY

For more data circle 500 on Postpaid Card

new shop equipment . . .

CHEMICAL COOLANT DESIGNED FOR GRINDING OPERATIONS

A new and improved type chemical coolant for grinding operations is being marketed by The Texas Co., 135 East 42nd St., New York 17, N. Y. This product is called Cooltex and is claimed to provide superior rust protection even in highly diluted solution, to settle grinding dirt rapidly and completely and to leave no sticky film on machine surfaces to collect dust or dirt. Cooltex is also transparent, giving the operator full view of his work in progress, and the company states that it does not develop unpleasant odors upon prolonged use.

The manufacturer states that there is no essential difference between Cooltex and soluble oil emulsions in their removal or dilution of way lubricants. However, Cooltex has been designed as a coolant, not a lubricant, so that where lubrication is not automatic it may be necessary to resort to more frequent lubrication whenever Cooltex is used in place of oil emulsions.

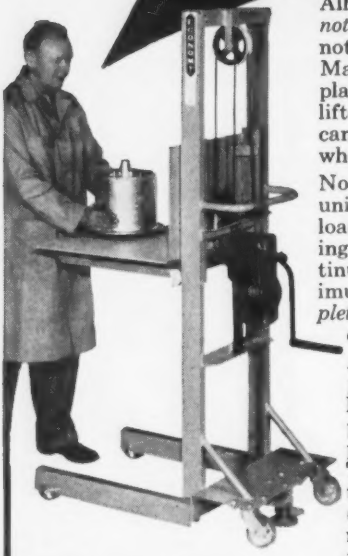
Although Cooltex has been specifically designed for use as a coolant in grinding operations, it can also be utilized on other types of machining operations where cooling, rather than lubrication, is the most essential consideration.

For more data circle 112 on Postpaid Card

ALL NEW

MARK II Shoplifter

$1950.00 FOB Chicago



All lifters at this price *are not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

ECONOMY ENGINEERING

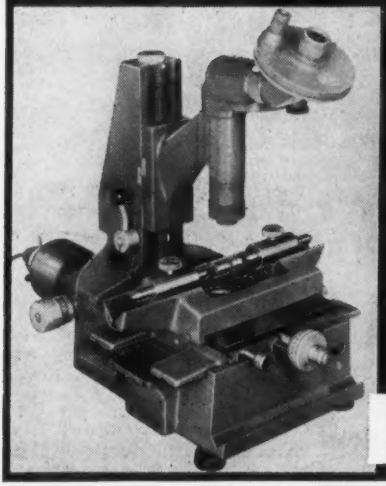
4507 W. Lake St., Chicago 24, Ill.

Write for specifications and other details.

For more data circle 501 on Postpaid Card

A JOB THAT ONLY A —

Leitz TOOLMAKER'S MICROSCOPE CAN DO!



- Permits measurements in 2 dimensions plus checking of Radii, Concentric Circles, threads and angles.
- Has exclusive intermediate image system which combines coordinate measuring microscope and optical comparator in one instrument.
- Built-in charts permit use in three magnifications.
- Reads to .0001" or to .00005" from Master glass scales in larger models.
- Available in 1" x 2", 1" x 4", 2.3" x 6", 6" x 6" and 8" x 40" capacity.

FREE BOOKLET—Write for new catalog.

OPTO-METRIC TOOLS, INC.
137MM VARICK STREET, NEW YORK 13, N.Y.

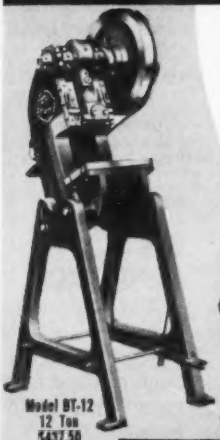
For more data circle 502 on Postpaid Card

ALLEN HEAVY DUTY PUNCH PRESSES

Powerful
Dependable and Economical
Fully Guaranteed

Hundreds of different
Model Combinations
1 to 12 ton Capacities

See your Supply Dealer or write for Catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.



Model BT-12
12 Ton
$437.50
less motor
fob



Model BT-5
5 Ton
$199.50
less motor
fob



Model B-2
2 Ton
$97.50
less motor
fob



Model LTX
Special Duty
1 Ton — $89.50
less motor — fob

Thousands in use the World over

ALVA ALLEN INDUSTRIES, Dept. M M, Clinton, Missouri

For more data circle 503 on Postpaid Card

LIVE CENTER HAS REPLACEMENT POINT IN ITS TAPER SHANK

Motor Tool Manufacturing Co., Post Office Box 3805, Detroit 5, Mich., has announced the availability of a live center that carries its own high speed steel replacement point "piggy-back" in its taper shank. This spare can be changed in a minute, cutting repair costs and lost time. The high speed steel tip covers the area of greatest wear, but the full diameter of the spindle is usable, as it is S.A.E. 52100 Hardened Steel. Points interchange within 0.0002 total inch runout.



Motor Tool "Piggy-Back" Live Center

A labyrinth plate protects the seal in order to keep chips and coolant out of the bearings. A steel spring protects the thrust bearing from overload. Points may be reground, as the threaded spindle can be rotated.

For more data circle 113 on Postpaid Card

★ mms ★

BUS CONDUCTOR

A substitute for smaller sizes of tubular bus conductor, Alcoa Universal Angle Bus Conductor (UABC), is now available from the

B&W Standard FLAT DRILL CHUCKS

for use with B&W Standard Flat Drills, Special Form Drills, and Reamers



Just Added to Our Line

Drill Chuck Style	Drill Slot Dimensions			Shank Diameter	Shank Length	Body Dia.	Body Lgth.	Price
	Thick	Wide	Deep					
#00	1/8	1/2	5/8	1/2 5/8 1	2-1/2	1	7/8	$11.50
#0	1/8	5/8	3/4	1/2 5/8 1	2-1/2	1	7/8	$11.50
#1	3/16	5/8	3/4	1/2 5/8 1	2-1/2	1	7/8	$11.50

Shipped from stock same day order received

Taper shanks, special sizes quoted on application.

B & W PRECISION PRODUCTS CO.

11393 E. Eight Mile Road, P. O. Box 3865
Detroit 5, Michigan, Engineering Dept. M.

For more data circle 504 on Postpaid Card

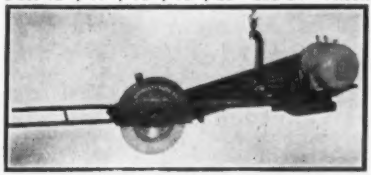
- PIERCING PUNCHES
- BUTTON DIES
- STANDARDS · SPECIALS

Also send Blue Prints for Estimates on screw machine products and centerless grinding.

PEMCO PERFORATORS CO.
DIVISION
PORTER MACHINE CO.
CINCINNATI 9 OHIO

For more data circle 505 on Postpaid Card

MUMMERT-DIXON SWING FRAME GRINDERS
Sizes 12", 14", 16", 18", 20" and 24" wheels



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.

For more data circle 506 on Postpaid Card

Small Parts ?







DIE CAST THEM
IN YOUR OWN PLANT
WITH MINIMUM INVESTMENT
ON

DCMT DIE CASTING MACHINES



Up to 1000 shots per hour! Write for FREE BOOKLET explaining entire process.

DCMT SALES CORP.
Dept. DR 1128
Div. British Industries Corp.
Port Washington, New York

For more data circle 507 on Postpaid Card

***How* SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!**

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-make square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.
The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH ROAD • DETROIT 41, MICH.

Write for Literature

For more data circle 508 on Postpaid Card

Aluminum Company of America, 952-H Alcoa Building, Pittsburgh 19, Pa. This product, an L shaped extrusion, was developed to provide a bus conductor that will adapt to normal cable lug connectors.

This new bus was intended primarily for use in distribution type substations. UABC can also be used advantageously in substations for sub-transmission voltages and for primary distribution voltages. Substitution of the conductor involves, in most cases, only one UABC per phase. UABC is available in the 3¼ by 3¼ by ¼ inch size in standard 25 foot lengths.

For more data circle 114 on Postpaid Card

★ modern machine shop ★

SWIVEL MACHINE VISE

Chicago Tool and Engineering Co., 8399 South Chicago Ave., Chicago 17, Ill., has added swivel machine vises to its Palmgren line. The Palmgren Low-Boy No. 325B and No. 425B Vises have been designed for milling, drilling, shaping, grinding and other operations which require a rugged holding device. The No. 325B Vise with swivel base is only 3 inches high overall and has a 3¼ inch jaw width, 1⅛ inch jaw depth and 3 inch jaw opening with ground steel jaw faces. The No. 425B Vise with swivel base is 3½ inches high overall and has a 4¼ inch jaw width, 1¼ inch jaw depth and a 4 inch jaw opening with ground steel jaw faces.

These vises can be used with or without the swivel bases. The vise

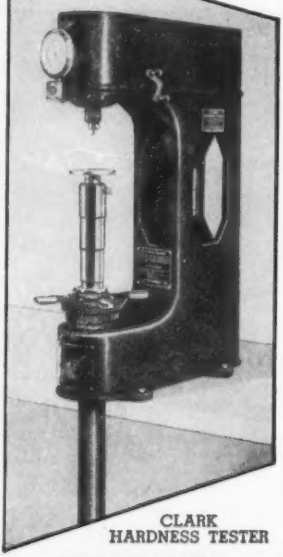
CLARK
TOMORROW'S ACCURACY TODAY

THE MOST FOR YOUR "ROCKWELL TESTING" DOLLAR!

The Clark Hardness Tester is precision built to give guaranteed precision results. Thousands of Clarks, with years of service all over the world, attest to this.

The surprisingly low price includes the precision Clark Diamond Cone Penetrator, as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 8", 12", or 16" work capacity.

Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and *guaranteed accuracy* of the Clark. Write today.



CLARK HARDNESS TESTER

CLARK INSTRUMENT, INC. 10204 FORD ROAD DEARBORN, MICH., U.S.A.

For more data circle 509 on Postpaid Card

Viking

• THE ORIGINAL COMPOUND **SHEAR**

Cuts straight, angle or circle in copper, brass, tin up to 12 gauge steel, etc. Special steel blades ground and tempered, adjustable and replaceable.



CUTTING PRESSURE
20 times the applied pressure

VIKING SHEAR COMPANY
1018 W. 20th ST. • ERIE, PA.

For more data circle 510 on Postpaid Card

MINIATURE DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths 1/4" to 3"
.0002 Tolerance on I.D.
O.D., and Concentricity
Specials to your specifications
WRITE FOR CATALOG

PREBCO BUSHING CO.
14702 East Arrow Hwy., Baldwin Park, Cal.

For more data circle 511 on Postpaid Card

SPRING LOADED LIVE CENTER



Eliminate excessive center. Use the accurate, rugged, reliable *NIROL. The overhang of your spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write for complete information.

*Reg. U.S. Pat. Off.

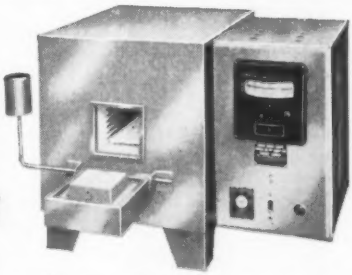


*NIROL MANUFACTURING COMPANY
901 H'WAY 22, N. PLAINFIELD, N. J.

For more data circle 512 on Postpaid Card

Stabil-Glow
BENCH MODEL
muffle furnaces

STABIL-GLOW R-A-D-I-A-T-I-O-N
NO HOT SPOTS



High Quality — Low Cost
Automatic — Dependable — Accurate
Blue M's NEW Modella Elements — 2000° F.

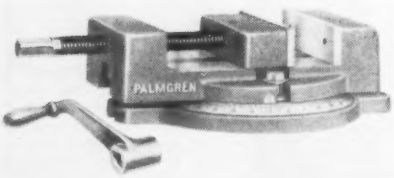
Efficient processing of parts is easy with Stabil-Glow. New element design and Electronic Controller gives automatic precision results. Modern design — for heavy industrial or laboratory usage. Ready to operate.

MODEL	MUFFLE SIZE	K.W.	VOLTAGE	PRICE
2010	5" W x 5" H x 12" D	2.4	115V.	$395.00
2030	6" W x 5" H x 13" D	3.0	230V/1 ph.	445.00
2050	9" W x 6" H x 13" D	6.0	230V/1 ph.	575.00

Larger capacity models with higher range and for 440 volts available.
Manufacturer of ovens, furnaces and related temperature controlled equipment.

BLUE M ELECTRIC COMPANY
138th AND CHATHAM STREET BLUE ISLAND, ILLINOIS

For more data circle 513 on Postpaid Card



Palmgren Low-Boy Swivel Machine Vise

body, as well as the base, has bolt slots for mounting to the machine table.

For more data circle 115 on Postpaid Card

★ modern machine shop ★

HIGH STRENGTH STEEL ELIMINATES HEAT TREATING OPERATIONS

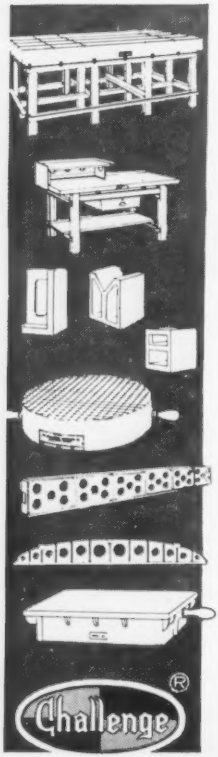
La Salle Steel Co., P. O. Box 6800-A, Chicago 80, Ill., has announced that its Fatigue Proof Steel Bars are now available in hexagon shapes in sizes from ¼ inch through 1½ inches. These hexagon shapes were developed to meet customer demand for a high strength material for studs, nuts, bolts and other types of fasteners or parts requiring this shape.

The company has also increased the size range of Fatigue Proof Rounds. Rounds are available in sizes from ¼ inch through 2-3/16 inches. In addition, sizes up to 2½ inches round are available upon inquiry.

Fatigue Proof is available in 140,000-160,000 p.s.i. tensile strengths and requires no heat treating. It is made by a process called "e.t.d." and is unusually easy to machine.

For more data circle 116 on Postpaid Card

400
Over ~~300~~ types and sizes of
PRECISION SURFACES
for LAYOUT, INSPECTION and ASSEMBLY
In Semi-Steel, Granite, Aluminum and Magnesium



Close tolerance precision work demands Precision Surfaces, and Challenge offers the broadest line of standard precision items to meet almost every precision need. This includes Angle Plates, V-Blocks, Straight Edges, Surface Plates and Floor Plates plus new lightweight Aluminum and Magnesium units. In addition, special types and sizes of precision surface equipment can be made to meet specific needs.



SE-116A

Ask for catalog information including complete specifications and prices. See your Industrial Distributor or write Challenge today.

THE CHALLENGE MACHINERY CO.
Grand Haven, Michigan

For more data circle 514 on Postpaid Card



WRITE FOR FREE CATALOG

- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

Rota FILE CORP.
1974—66TH ST.
BROOKLYN, N.Y.

For more data circle 515 on Postpaid Card



PACE TAPER ROLLER BEARING LIVE CENTERS

ACCURACY
± .0001" TIR

RIGIDITY
Preloaded with two Precision Matched Timken or Bower Taper Roller Bearings

for . . . GRINDING • PRECISION TURNING HEAVY-DUTY OPERATIONS

Write to:

PACE ENGINEERING COMPANY
1507-B E. Michigan St., Indianapolis, Ind.

For more data circle 516 on Postpaid Card

PALMGREN Machine Vises and Rotary Tables

There are 64 different models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories — the most complete line of vises and tables available anywhere.



No. 84
8"
TILTING, INDEXING and ROTARY TABLE $139.50



No. 60B 6"
SWIVEL MACHINE VISE $99.95

Used in all industries — everywhere.

Get this FREE Catalog NOW





No. 2B 4"
HEAVY DUTY ANGLE VISE
$149.95

CHICAGO TOOL AND ENGINEERING CO.
8399 S. Chicago Ave., Chicago 17, Ill.

For more data circle 517 on Postpaid Card

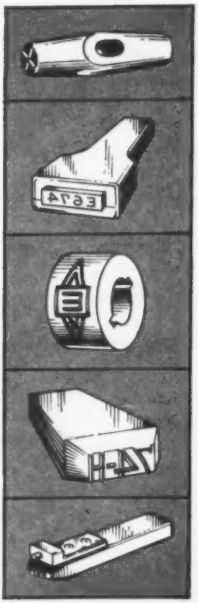
make your mark...



with
HOGGSON
time-tested
STEEL STAMPS



Whatever your need for product marking may be, Hoggson stamps can meet it. They are made of finest alloy steel, heat-treated to stand continuous impact without breaking face or mushrooming body. Ask about our inspectors' symbol marking hammers, type holders, hand stamps with locating or positioning attachments, marking dies for hand and machine use.

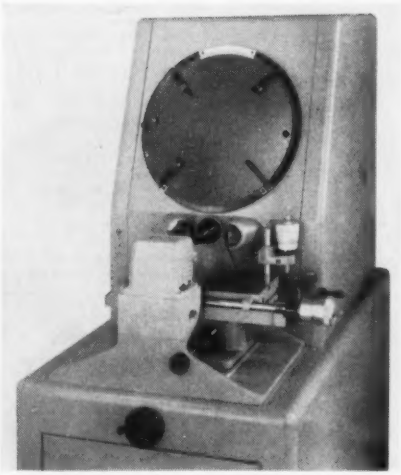


HOGGSON & PETTIS MFG. CO., New Haven 7, Conn.
For more data circle 518 on Postpaid Card

new shop equipment . . .

OPTICAL COMPARATOR

Covel Manufacturing Co., Benton Harbor, Mich., has announced the No. 14 Optical Comparator arranged with micrometer measuring screws, instead of dial indicators, for the purpose of taking direct measurements.



Covel Model No. 14 Optical Comparator

The micrometer screws are an optical feature designed for those customers

CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 519 on Postpaid Card

NEW...BENCH NUMBERING PRESS MODEL 136

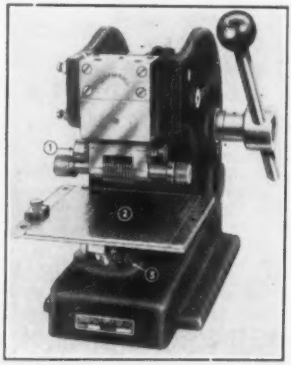
This new small, light, compact Press was designed for stamping small Name Plates and small flat articles with up to 1/8" high characters.

It weighs only 65 lbs. yet has the power and strength of a press much larger in size.

Its compactness and small size, combined with its power, should be very welcome where saving of valuable space and leaving larger power presses free for other work is of importance.

The model 136 is hand operated, using a cam to obtain pressure. The fact that this press has only three moving parts makes it extremely easy to maintain.

Any Numbering Machine, automatic or non-automatic, Typeholders with interchangeable Steel Type, or Special Dies can be operated in this Press.



Write for bulletin MS-136

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle 520 on Postpaid Card



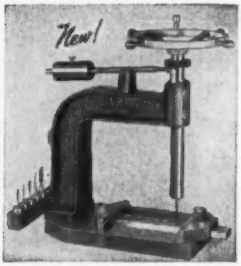
STUDY SHOP MATH OR MECH. DRAWING FOR BETTER PAY, PROMOTION

Learn at home for faster advancement in industry! These 2 important Acme courses provide basic education for industrial work—both are complete, thorough, 100-hour courses—either will better equip you for rapid advancement! Or go on to our famous, thorough, comprehensive

TOOL AND DIE DESIGN TRAINING

a career opportunity! Write today for free details (specify course) to **Acme School, Dept. 106, 50 S. Jefferson St., Dayton 2, Ohio.**

For more data circle 521 on Postpaid Card



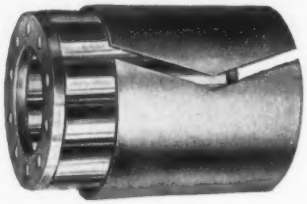
LASSY

Supersensitive Hand Tapper

New exclusive features and top quality make Lassy Tappers outstandingly the finest available. *Write for New illustrated catalog on Time Saving Devices.*

LASSY TOOL COMPANY, Plainville, Conn.

For more data circle 522 on Postpaid Card



TYPE GC

INDUSTRIAL ROLLER BEARING

STANDARD SIZES ARE SHOWN IN OUR GENERAL CATALOG SENT UPON REQUEST. SPECIAL SIZES TO ORDER.

ANY QUANTITY, "ONE BEARING OR MANY"

THE GWILLIAM COMPANY

Incorporated 1912

358 FURMAN ST. BROOKLYN 1, N. Y.

For more data circle 523 on Postpaid Card

HIGHER SPEEDS! FASTER GRINDING!

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.



Weight 12 ounces, length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U.S.A.

For more data circle 524 on Postpaid Card

who prefer micrometer screws to dial indicators.

In addition to the micrometer screws, this improved model is arranged with surface illumination and a precision plastic deep-etch protractor screen and vernier.

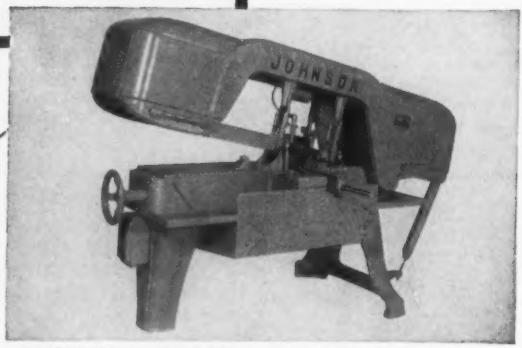
For more data circle 117 on Postpaid Card

QUICK-CHANGE CHUCK FOR SINGLE SPINDLE MACHINES

A line of Safety-Guard Quick-Change Chucks for radial drills and drill presses has been announced by Scully-Jones and Co., 1909 South Rockwell St., Chicago 8, Ill. This latest development makes tool changes fast and safe when doing sequence drilling, counterboring, reaming and tapping operations on single spindle machines.

For changing tools, the operator has only to grip the plastic safety-guard instead of the collet itself, while lifting the locking ring of the quick-change chuck with the other hand. The lip of the safety-guard prevents the collet from slipping through the operator's fingers. Since the guard rotates freely on the collet, acting as a free-running bearing between the operator's hand and the collet, friction is eliminated. At high spindle speeds, the fact that the operator can just lift up on the safety-guard without touching the collet or cutting tool, prevents accidents and tool damage. Safety-Guard

Johnson Speaks for itself in ANY SHOP!



Model J (Heavy-Duty) (Wet or Dry Models)

Johnson Model "J" . . . the heavy duty band saw that speaks for itself. No other saw handles so many operations so easily and so economically. Why pay more when a Johnson Model "J" can cut the 10" rounds, 18" flats and odd shaped steels of your shop in such labor saving time. The Big "J" is completely automatic—and is available in a wet or dry model, both with variable speed and centralized control system. You can't afford to miss any information on the rugged Johnson Model "J". Contact your dealer today!

Johnson MANUFACTURING CORPORATION
1012 Barnes Street • Albion, Michigan

Eastern Distributor	*Midwestern Distributor*	*Western Distributor*
R. J. R. KELLY CO.	**W. Q. LUNDMARK**	**HASTINGS DISTRIBUTORS**
Hale Bldg., 51 Main St.	75 N. Broadway	1605 Solano Avenue
East Orange, N. J.	Des Plaines, Ill.	Berkeley, Calif.

For more data circle 525 on Postpaid Card

HORIZONTAL
SURFACE GRINDING
Up to 24"x144"—Fine Micro Finish
BLANCHARD GRINDING
To 85" diameter and up to 20"x120"
• 24 Hour Service • Steel and Aluminum Plate, any size, shape or thickness • Weldments • Shear blades sharpened up to 12'.
Direct Factory Agents For All Types of Knives and Blades
SAL METAL PRODUCTS CO.
120 Freeman St., Dept. MM, Brooklyn 22, N. Y.
EVergreen 9-2560
For more data circle 526 on Postpaid Card


YOU GET SOMETHING EXTRA WHEN YOU USE
Comet®
BORING TOOLS
(H. S. S. and Carbide)
for Holes from 1/16" upward
STANDARD AND SPECIAL BORING, FACING & INTERNAL THREADING TOOLS. *Write for Data*
Bore Small Holes? Contact COMET
COMET Tool Co.
738 M-4 Broadway, New York 3, N. Y.
For more data circle 527 on Postpaid Card

HOWALD CARBIDE MILLING CUTTERS

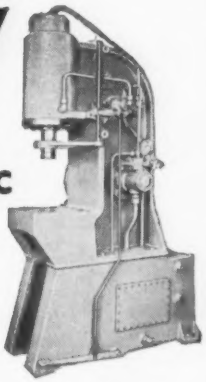
- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.


PATENTED END MILL
PAT. SHELL MILL
SEND FOR BULLETIN
W. T. HOWALD MACHINE WORKS
182 SIGOURNEY ST., BROOKLYN 31, N. Y.
For more data circle 528 on Postpaid Card

Greenerd PRESSES
ARBOR & HYDRAULIC

- ASSEMBLING
- BROACHING
- FORMING
- STRAIGHTENING

ARBOR Presses 1/4 to 20 TONS
75 YEARS
For 75 years, GREENERD has exclusively manufactured presses for production Assembling, Broaching, Forming, Straightening, etc., sold by Machine Tool Dealers and Mill Supply Houses.
GREENERD Presses may be furnished to J.I.C. standards.

HYDRAULIC Presses 2 to 75 TONS

Greenerd ARBOR PRESS CO.
4 CROWN ST., NASHUA, N.H.
For more data circle 529 on Postpaid Card



AIRETOOL pneumatic production tools

Airetool production tools reduce operator fatigue, help him step up hourly output. You get increased production efficiency. Model 500 extra heavy duty die grinder (above) cuts costs on production jobs and fine die finishing. On intricate grinding, filing and cutting operations, Airetool midget die grinders save time and money.



Vertical Sander and Grinders. Model 500-V sander (illustrated), 7″ sanding disc, finishes flat or contour surfaces with feather-touch accuracy. Other medium and heavy duty grinders for 6″ abrasive wheels; controlled speeds, 4500-6000 rpm.



Light, compact Pneumatic Drills pay for themselves in increased production. 5/32″, 3/16″, and 1/4″



Heavy Duty Drill combines speed and portability. ½″, 5/8″, ¾″

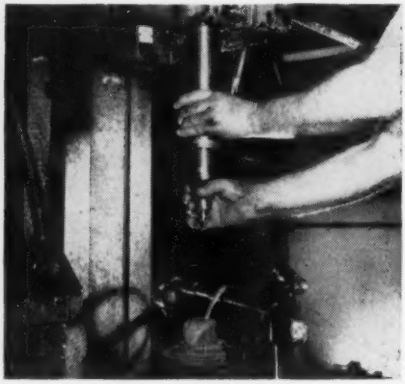
WRITE FOR FREE AIRETOOL PNEUMATIC TOOLS CATALOG NO. 63

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

Offices and Representatives in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, England, Europe, Italy, Hawaii, Japan.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: 37 Spalding Dr., Brantford, Ont.

For more data circle 530 on Postpaid Card

new shop equipment . . .



This Safety-Guard Collet has been designed for Scully-Jones Quick Change Chucks

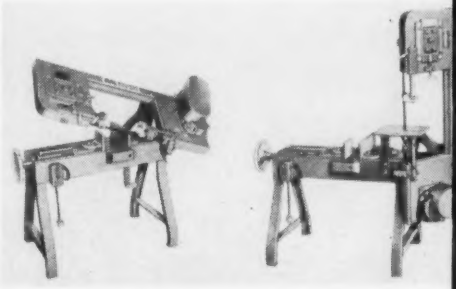
Collets are available for chuck sizes Nos. 0-5, with outside diameters of 11/16 inch to 3¼ inches.

For more data circle 118 on Postpaid Card

★ modern machine shop ★

METAL CUTTING BAND SAW IS CONVERTIBLE

Wells Manufacturing Corp., 808 Tyler St., Three Rivers, Mich., has announced an addition to its line of



Wells Model 58-B Band Saw is convertible

New 1958 Model "SS"

RADIUS DRESSER



OUTPERFORMS THEM ALL Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations.

Low Price $124.50 with Diamond

Write for free illustrated folder.

SOMERSET TOOL CO.

320 Virginia St. Hillside, N. J.

For more data circle 531 on Postpaid Card

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it". Simple to operate.



COMPLETE LEAD HAMMER SERVICE

Write for circular and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

For more data circle 532 on Postpaid Card

DORMAN AUTOMATIC REVERSE TAPPERS



- **Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.**
- **WIDE RANGE TAP CAPACITY.**

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel — 1/2" in Aluminum.

No. 2B POSITIVE TAPPER—capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER—capacity 1/2" to 1 1/4" in Steel—1/2" to 3/4" Pipe Taps.

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

- **PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.**

Priced from **$62.00**

Write for Bulletin

IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc.

1034 N. PLUM STREET, LANCASTER, PA.

STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER SPINDLE

For more data circle 533 on Postpaid Card

introducing 2 *New* members of a growing family of... Jiffy BAGS



JIFFY REINFORCED PADDED SHIPPING BAG

Highly tear resistant. Doubly water proof. Reinforced with fiber mesh.

JIFFY UTILITY BAG

(Not padded)

Low cost shipping bag for non-fragile items. Moisture proof. Strong.

Write today for your free samples and descriptive literature.

JIFFY MANUFACTURING CO.

377 FLORENCE AVE., HILLSIDE. N. J.

For more data circle 534 on Postpaid Card

metal cutting band saws. This convertible machine, the Model 58-B, has been designed for dual duty; as an upright band saw or for horizontal cut-off work. As a horizontal cut-off machine, the 58-B will handle rounds up to 6 inches, rectangular shapes up to 6 by 10 and 5 by 5 inches at 45 degrees. This unit easily converts to an upright saw; just swing the head to vertical position and install the work table.

Selective speeds are 76, 141 and 268 f.p.m. The blade (½ by 0.025 by 93½ inches) is driven by a 1/3 h.p. ball bearing motor, equipped with a manual starter, featuring automatic stop when it is used as a horizontal cut-off saw.

The frame and bed of this rugged, compact saw are of welded steel construction. This model also features a quick action vise and adjustable blade guides. Disc type idler and drive wheels run on grease sealed ball bearings. Net weight of the unit is approximately 220 pounds.

For more data circle 119 on Postpaid Card

★ mms ★

MOTORIZED SPINDLES

A complete redesign of its precision motorized spindles has been announced by the Cincinnati Electrical Tool Co., 367 Mt. Hope Ave., Cincinnati 4, Ohio. Covering the range from ½ to 10 h.p., these spindles permit selective assembly of single or compound feeds. Other accessories, such as wheel



For more data circle 535 on Postpaid Card

JIG BORING

and

Large Precision Machining

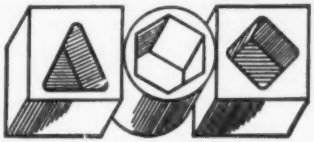
Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 536 on Postpaid Card



DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

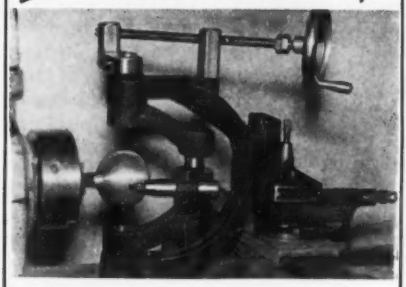
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS

Wilmerding, Pa.

For more data circle 537 on Postpaid Card

New RADITURN ✓



CUTS ANY RADIUS

Convex, Concave or Ball

Patented

The accurate short cut for turning any radius. Adaptable to most any lathe.

Contact your tool supplier or write for details.

RETCO MFG. & SALES

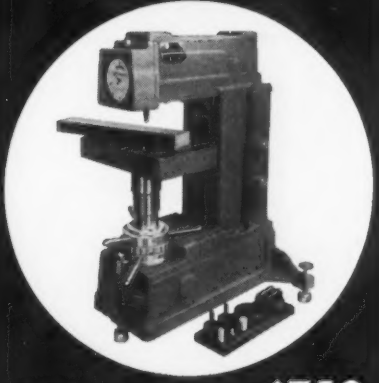
1458 E. CLINTON • FRANKFORT, IND.

For more data circle 538 on Postpaid Card

2 Applications

(Regular and Superficial)

1 Tester



KENTRALL MODEL CT-2 $750.

Hundreds of installations over the past few years have proved the economy of the only hardness tester which combines all scales of Rockwell Test (15 to 150 kg. loads).

The Kentrall cuts costs because it does the job of two conventional testers, requires only half the space and maintenance. Write for more detailed information, plus a list of prominent users who have switched to Kentrall. TB147

KENTRALL

THE TORSION BALANCE COMPANY

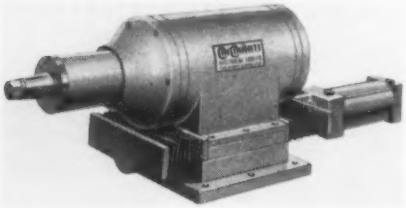
Main Office and Factory:

Clifton, New Jersey

Sales Offices: Chicago, San Francisco

For more data circle 539 on Postpaid Card

new shop equipment . . .



Cincinnati Redesigned Motorized Spindle

holders and guards, power cylinders, micrometer dials, non-metallic ways and so on, are available.

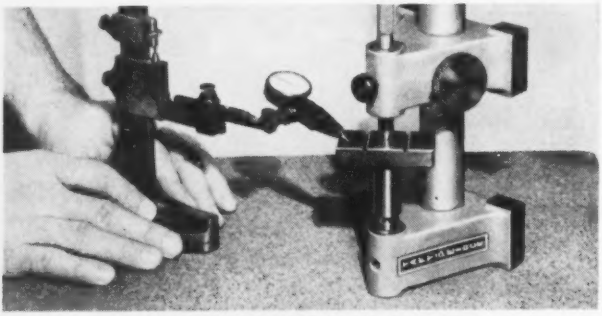
For more data circle 120 on Postpaid Card

★ modern machine shop ★

HELICAL GEARED SPEED REDUCERS

A line of helical geared speed reducers, designed for easy adaptation to an unlimited variety of mounting positions, has been announced by Boston Gear Works, 68 Hayward St., Quincy 71, Mass. This Optimount Series features a basic unit, with either single or double reduction helical gearing, which can be mounted directly on the driven shaft or mounted in standard stock horzontal or vertical bases. Four sizes of basic units provide output speeds of from 10 to 431 r.p.m. and capacities of 1/6 to 15 horsepower.

The basic units are available in three types. Optimount Reductors are designed for vee belt, sprocket or gear drive to input shaft. Optimount Ratiomotors provide direct motor drive to



To indicate face runout, stand the Instrument Bench Centers vertically on precision ground headstock pads.

New! Instrument Bench Centers Speed Inspection of Miniature Parts



No. 9205M Instrument Bench Centers checking miniature crankshaft for concentricity after O.D. grinding operation.



Complete Line of Bench Centers

The Taft-Peirce Standard Bench Center Line includes models with work capacities from 8″ dia. x 18″ to 10″ dia. x 60″. Special sizes designed and built to order.

These new Taft-Peirce No. 9205M Instrument Bench Centers are specifically designed for speed, accuracy, and versatility in checking miniature and sub-miniature parts.

When placed horizontally on a surface plate of known flatness, the centers line up automatically within close limits, and a quick turn of a knurled knob locks them in position. The entire unit may then be turned up on end to check runout and squareness of shoulders and sides of grooves.

An exclusive feature is an adjustable headstock center point that may be rotated to bring the work centers perfectly parallel to the surface plate. This allows the inspector to obtain a precise reading of concentricity and parallelism in a horizontal plane, and shoulder runout in a vertical plane.

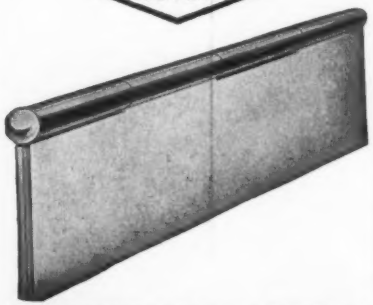
Maximum capacity — 8″ long x 3″ diameter. Send for Bulletin ST-005.

TAKE IT TO TAFT-PEIRCE

WOONSOCKET, RHODE ISLAND

For more data circle 540 on Postpaid Card

AUTOM



CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

WRITE FOR CATALOG

1114 E. 87TH ST. CHICAGO 19

For more data circle 541 on Postpaid Card

RIVETERS . . .

GRANT

PIONEERS and PACEMAKERS in their line



—head rivets from smallest to 3/4" diameter cold steel, either by NOISELESS SPINNING or VIBRATING HAMMER method — fast, economically — types include Vertical and Horizontal Spindles, foot-power or automatic.

Free estimates of your work. Write for catalog today.

THE GRANT MFG. & MACHINE CO.

96 Silliman Ave. Bridgeport 5, Conn.

For more data circle 542 on Postpaid Card

"We Are Extremely Well Pleased With

TRICO-MIST"

(Name on request)

This production manager writes: "We had difficulties with a drilling operation on aluminum. After installing a TRICO-MIST, we were able to increase production at a lower cost of operation and turned out a better finished product. We are extremely well pleased with the TRICO-MIST Coolant System."



Yes, For As Little As $22.00

you, too, can increase production, obtain finer finishes and accuracy on all your drilling, tapping, milling, sawing, grinding and other operations.

Get Complete Details

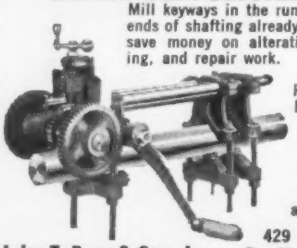
SEND FOR BUL. NO. 37

TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.

For more data circle 543 on Postpaid Card

BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erecting, and repair work.



ALSO Planer-type MILLER up to 144" table length.

Write for Bulletins and prices.

John T. Burr & Son, Inc. 429 Kent Ave. Brooklyn, N. Y.

For more data circle 544 on Postpaid Card

QUALITY ACCURACY COLLIS DURABILITY SERVICE



STANDARD TYPES

SLEEVES

AND

SOCKETS

NOW!

HEAT TREATED . . .

So popular with users.

COLLIS Heat Treated Sleeves and Sockets are manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures same accuracy with longer runs.

Call at once for our representative to explain about the Complete Collis Line of Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sleeves and Sockets and Collets.

"Call Collis for Service"

THE COLLIS CO.

DEPT. A, CLINTON, IOWA

For more data circle 545 on Postpaid Card

new shop equipment . . .



(Upper left) Optimount Reductor for shaft mounting, (lower left) helical gearing in single reduction unit, (upper right), horizontal base mounted ratiomotor, (lower right) vertical base mounted flanged reductor

input shaft. Optimount Flanged Reductors are the Optimount Ratiomotor units sold without motor, ready for attaching motors of the customer's choice.

For more data circle 121 on Postpaid Card

★ modern machine shop ★

HOT HARDNESS TESTER

Hot hardness testing, utilizing a Rockwell tester in conjunction with a small electric furnace, has been developed by the Wilson Mechanical Instrument Division, American Chain and Cable Co., Inc., 230-G Park Ave., New York 17, N. Y. Designated as the Model 6-JR Hot Hardness Tester, the device can be utilized to determine the Rockwell hardness of metals, contained within the shell of a controlled at-

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY



At last, a top quality industrial sander that provides all the most wanted features – yet sells for so little. **$89.95**

complete-with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 546 on Postpaid Card

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Hand lever closes and locks while lathe is running.



Jaws locked



Write for bulletin 201 today.

CHUCK DIVISION

THOMAS HOIST CO.

28 S. HOYNE • CHICAGO 12, ILL.

For more data circle 547 on Postpaid Card

They're now available from stock in new standard 18" lengths!



ACE

LONGBOY DRILLS

Been buying costly "specials" for deep hole drilling operations? Then you'll be glad to know that Ace Longboy Drills are now available from stock in a wide range of standard sizes and in both 12" and 18" lengths! What's more, their polished flutes are precision ground in top quality pre-hardened high speed steel to provide a finer finish, keener cutting edges, and longer drill life.

Call your local Ace Drill Distributor today!



ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

For more data circle 548 on Postpaid Card

HOW TO . . . Bend Thin-Walled Tubing, faster and better . . . with CERRO* ALLOYS



For bending thin-walled tubing, CERROBEND®... a low-temperature-melting bismuth alloy (CERRO ALLOY)...is the ideal filler. CERROBEND is poured into an inclined tube immersed in hot water, then the loaded tube is removed and rapidly quenched in cold water. Upon assuming shop temperature, the loaded quenched tube can be bent over a forming block or in a regular bending machine. The CERROBEND ALLOY melts out easily in boiling water.

CdeP®

Send for Bulletin H-3, and the CERRO ALLOY "HOW TO" applications booklet.

CERRO DE PASCO SALES CORPORATION

304 PARK AVENUE, NEW YORK 22, N. Y.

*T.M. Cerro de Pasco Corporation

For more data circle 549 on Postpaid Card

Fisher Benders



A simple, sturdy machine designed to do its work in the easiest way, this bender is made of best quality malleable iron castings and has a hardened steel bending blade.

Capacity: 7/16" square or round iron
2" x 1/2" channel iron
2 1/4" x 5/16" flat iron

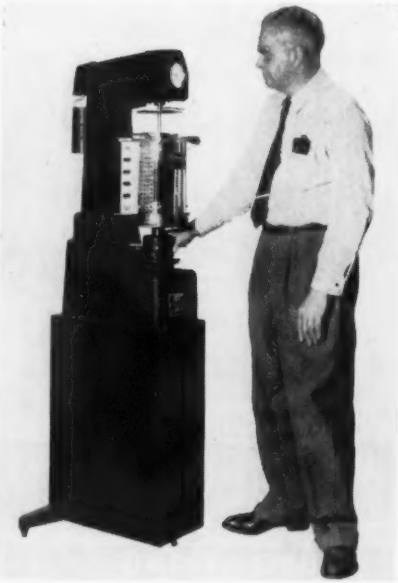
Catalog sheets on complete line available.

T. H. LEWTHWAITE MACHINE CO.

317 East 47th Street New York 17, N. Y.

For more data circle 550 on Postpaid Card

new shop equipment . . .



Wilson Model 6-JR Hot Hardness Tester

mosphere gas furnace, at temperatures exceeding 1,500 degrees Fahrenheit.

For more data circle 122 on Postpaid Card

★ modern machine shop ★

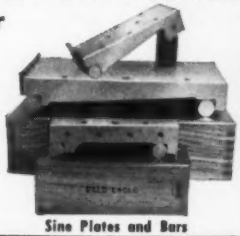
DUST COLLECTORS

Torit Manufacturing Co., 296 Walnut St., Dept. 702, St. Paul 2, Minn., has announced conversion of its line of high efficiency cyclone separator-type dust collectors to radial fans. The fan change will give increased performance on all models, because the radial wheels move more c.f.p.m. of air and operate efficiently against higher resistances (static pressure). In addition, the new fans eliminate build-up of foreign material on the blades

ACCURATE—LOW COST SINE BARS and PLATES

5" Sine Bar only $26.50

- Guaranteed Accuracy
- Precision Ground
- Hardened Rails
- Double Normalized
- Tapped Holes
- End Plates
- Solid Oak Case Extra
- Immediate Shipment



Sine Plates and Bars

No.	Cent. Dist.	Width	Price	With Oak Case
1605	5"	3"	39.95	45.50
1610	10"	5"	87.50	95.00
1705	5"	1"	26.50	30.75

FOB St. Paul.

Accurate to .0002" in center distance and parallelism for the length of the tool. Order Today—from your dealer or direct.

Bald Eagle Corporation

(Formerly Bald Eagle Tool Company)

356 Cedar St. St. Paul 1, Minn.

For more data circle 551 on Postpaid Card

HOLD IT... *Mister!*

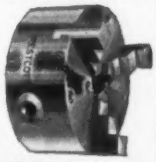


WITH A **WESTCOTT CHUCK**

Top Quality Chucks Since 1872

HEADQUARTERS for SPECIALIZED CHUCKING PROBLEMS

- Engineering know-how
- Complete facilities
- Precision standards
- Ship from stock
- Satisfaction guaranteed



SEND for FREE CATALOG

Sold by Industrial Distributors, Coast to Coast

ONEIDA MACHINE TOOL CORPORATION

700 E. Walnut St. Oneida, N. Y.

For more data circle 552 on Postpaid Card

ABER *Curved Tooth* MULTIPLE CUTTERS



By using the wide range of Standard ABER CUTTERS for gang milling... fast accurate cuts on any number of surfaces simultaneously.

ABER Engineering service will design and make the unit exactly suited to your job . . . send blueprints and specify material to be cut.

ABER *Curved Tooth* PLUS FEATURES

1. Longer production runs
2. More accurate control of limits and finish
3. Elimination of chatter
4. Faster heat dissipation
5. Shearing action

FREE DATA — 24 page catalog on milling with ABER Cutters.

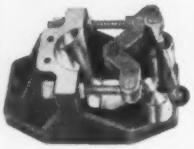


ABER ENGINEERING WORKS

WATERFORD, WISCONSIN

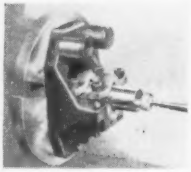
For more data circle 553 on Postpaid Card

LASSY WORKHOLDERS



A basic tool for many uses and with accessories provides many fast setups for production, eliminating the need for single purpose fixtures. Accurate to .0002.

Lassy Work Holders maintain repetitive work alignment and accuracy.



Write for New Illustrated Catalog on Time Saving Devices

LASSY TOOL CO.

PLAINVILLE, CONNECTICUT

For more data circle 554 on Postpaid Card

KEO



STRAIGHT SHANK MACHINE COUNTERSINKS

•

HIGH SPEED STEEL

•

4 FLUTES

Cuts ½" to 1". Furnished with 60, 82 or 90 degree included angle. Specify desired degree of angle. Large stocks on hand.

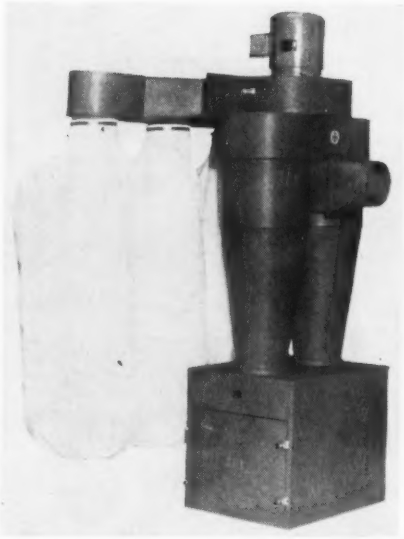
Jobbers' Inquiries Invited

KEO CUTTERS, INC.

25040 Easy St., Warren, Mich.
Warehouse: 1300 S. Soto St., Los Angeles 23, Calif.

For more data circle 555 on Postpaid Card

new shop equipment . . .



Torit Cyclone Separator-Type Dust Collector

in unusual situations where conventional fans might become clogged.

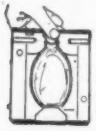
These cyclone separator models are recommended for use where large volumes of dust, lint or buffing compound must be collected. In operation, dust-laden air is drawn into the collector, where spiral baffles direct it into a whirlwind motion. Dust particles are precipitated out of the air stream by centrifugal force.

For more data circle 123 on Postpaid Card

★ modern machine shop ★

SIX SPINDLE PRECISION BORING HEAD

The Pope Machinery Corp., 261 River St., Haverhill, Mass., has announced a six spindle precision boring head with hole to hole tolerances of



Expedite Mold-Making with CERRO* ALLOYS

Low-temperature-melting CERRO ALLOYS are excellent for rapid, accurate, inexpensive production of molds. A typical example is the Polyethylene bottle mold of which one-half is shown above. Patterns, secured to a metal plate, are sprayed with molten CERRO ALLOY to a depth of 1/16", then removed and incorporated in a chase. A copper tube for rapid water cooling is included in the mold. Thousands of bottles were produced from this mold. For detailed information send for Bulletin G2, and the new CERRO ALLOY "HOW TO" applications booklet.

CDeP

CERRO DE PASCO SALES CORPORATION

304 PARK AVENUE, NEW YORK 22, N. Y.

*T.M. Cerro de Pasco Corporation.

For more data circle 556 on Postpaid Card

BETTER WAY TO CLEAN

DIES and individual metal PARTS

For

- PRODUCTION
- MAINTENANCE

MODEL 500 $329.00



Get a GRAYMILLS CLEAN-O-MATIC Parts Washer

1. No heating, no vapor
2. Flush chips and dirt from metal parts with filtered solvent
3. Clean out blind holes and cavities
4. Do it thoroughly, fast and safely

Send for catalog and prices 152

GRAYMILLS CORP. 3760 N. Lincoln Ave Chicago 13, Ill.

For more data circle 557 on Postpaid Card

HEAVY DUTY VIMCO *Lights* UL

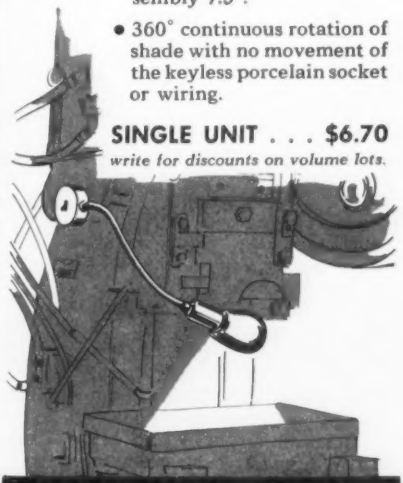


This heavy duty industrial light has a flexible arm lamp with separate Toggle Switch control. The light and arm are fully adjustable for concentrated supplemental lighting and has UL approval.

- 29" overall length from 3¼" octagon base to shade tip.
- 18" long flexible arm.
- Overall length of VIMCO Special Socket-Shade Assembly 7.5".
- 360° continuous rotation of shade with no movement of the keyless porcelain socket or wiring.

SINGLE UNIT . . . $6.70

write for discounts on volume lots.

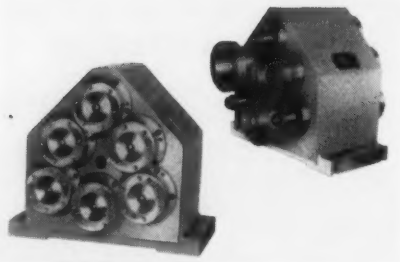


VIMCO MFG. CO., Inc.

109 Brayton Street • Buffalo, N. Y.

For more data circle 558 on Postpaid Card

two ten-thousandths. This head is equipped with six Pope heavy duty, precision boring spindles, capable of boring holes round within millionths of an inch and designed to produce fine surface finishes in the lower micro inch range. These spindles incorporate large cylindrical roller bearings to provide rigid support of the tool and, also, smooth, chatter free operation. Preloaded, super precision ball thrust bearings eliminate endwise movement of the shaft in either direction.



Pope Six Spindle Precision Boring Head

For more data circle 124 on Postpaid Card

★ mms ★

SNAGGING GRINDER

The United States Electrical Tool Co., 3640 Llewellyn St., Cincinnati 23, Ohio, has announced its hydraulically driven snagging grinder, the Model 61HVS. It eliminates gears, belts and adjustable pulley drives. The hydraulic drive is operated by a totally enclosed fan cooled ball bearing motor working a hydraulic pump,

New IDEAL GOLD BAND

LIVE CENTERS

GUARANTEED TO MATCH ACCURACY AND CAPACITY OF YOUR LATHES



In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, (to ± .0001") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today!

A COMPLETE LINE FOR EVERY NEED—SPECIALS TOO!



IDEAL INDUSTRIES, Inc.
1031-J Park Ave.
Sycamore, Illinois

Write for Complete catalog data and specifications.

For more data circle 559 on Postpaid Card

MODULAR MACHINING

with small way-type machine units — drilling, tapping, boring, etc.

g

up to 2 H.P.
up to 6" strokes
#2 M.T.
spindles
with & without
draw bar



GOTHA, INC. Box 430A Harvey, Illinois

For more data circle 560 on Postpaid Card

JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

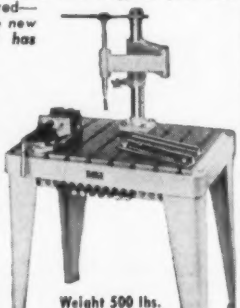
ROUTE 22, MOUNTAINSIDE, N. J.
Telephone: ADams 2-7300

For more data circle 561 on Postpaid Card

Try this Allman Universal Hand Tapper FREE for 15 days—

Results have proved that once this tapper is in your shop or tool-room and you find 70% of your free hand tapping time saved—it will stay there! *The new Allman hand tapper has these advantages:*

- Articulate arm swings clear of large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vise holds work as small as ⅜" square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds.



Weight 500 lbs. Crated ready for shipment. Write for pamphlet and information.

TOOLS, INC.

1734 No. 25th Ave. • Melrose Park, Ill.

For more data circle 562 on Postpaid Card

New CATALOG

WM. SOPKO & SONS CO.

GRINDING WHEEL ADAPTERS

AND TOOLROOM ACCESSORIES



finest quality ADAPTERS

- Precision-made, Hardened and Ground with Heat Treated Nuts
- Complete Line—4 New Models Available
- For Use on All Popular Surface Tool and Cutter Grinders
- Large Stocks—Immediate Delivery

USE SOPKO ADAPTERS—SAVE TIME, TROUBLE AND MONEY

WM. SOPKO & SONS CO.
140 E. 267th ST. • EUCLID 32, OHIO

Please send your New Free Illustrated CATALOG

NAME _____ TITLE _____

COMPANY _____

STREET _____

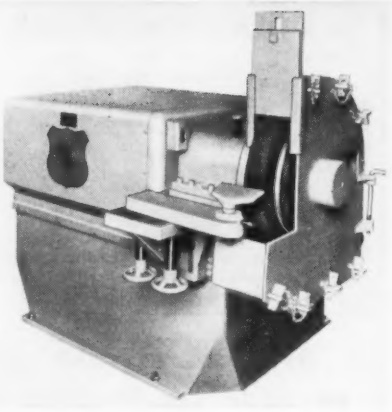
CITY _____ STATE _____

For more data circle 563 on Postpaid Card

which moves the fluid contained in the grinder base through the hydraulic motor. This provides constant horsepower, constant peripheral speed and automatic wheel wear adjustment which results in increased production, long wheel life and low maintenance costs.

To maintain constant wheel periphery and to compensate for wheel wear, an automatic speed changer is furnished with the Model 61HVS. Spindle speed is increased automatically through a safety interlock speed changer, which sizes the correct r.p.m. speed with the wheel diameter each time the grinder is stopped.

Other features include magnetic pushbutton starter, shaft lock, boiler plate wheel guard, exhaust outlet and quick release guard cover, adjustable spark breaker and so on. The unit is available for 220, 440 or 550 volts, 60 cycle, two or three phase, alternating current.



Snagging Grinder is hydraulically driven

For more data circle 125 on Postpaid Card

UNIVERSAL DIVIDING HEADS



• Precision built to meet every requirement, Carroll Dividing Heads are the accepted standard in metal-working plants from coast to coast. • A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.

Write for 8 page catalog giving complete details, etc.

Other Models 6" With or Without Direct Indexing.



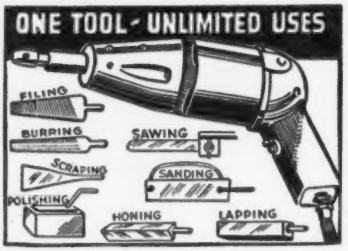
10"-12" Universal Right or Left Hand Dividing Heads with or without Direct Indexing. Also with Spiral Drive.

CARROLL DIVIDING HEAD CO.

3525 Cordiff Ave. • Cincinnati, Ohio

For more data circle 564 on Postpaid Card

B-R-E-A-K . . .
Hand Finishing Bottlenecks
with Portable • Electric Reciprocating Tools



These handy tools will cut out many tedious hand filing and finishing operations—Increase Production—Produce Uniform Work.

Light In Weight — Delivers 1/8" or 3/8" fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.

ACME TOOL CORP.

73 WEST BROADWAY NEW YORK 7, N. Y.

For more data circle 565 on Postpaid Card

NIBBLE *Your* COSTS WITH . . .

SAVAGE NIBBLING MACHINES



- TUBE CUTTING
- CIRCLE CUTTING
- STANDARD NIBBLING
- FREE-HAND or TEMPLATE CUTTING
- SPEED WITH ACCURACY NO SECONDARY OPERATIONS
- SPEED WITH SAFETY NO OPEN FLAME OR SPARKS

Up to 3/4" Capacity in MILD STEEL

QUOTATION ON REQUEST

W. J. SAVAGE COMPANY

KNOXVILLE TENNESSEE

NIBBLING MACHINE PIONEERS

For more data circle 566 on Postpaid Card

HYDRAULIC LIFT TABLES



Pat. Pending

Lexco portable adjustable height—hand or foot operated—saves you MONEY—TIME—ENERGY. For lifting and transporting heavy castings, dies, machine accessories and parts to machines and presses. Capacities to 2,000 lbs. Special sizes available—also AIR LIFTS and DIE HANDLERS.

Write for free bulletins.

LEXCO ENGINEERING & MFG. CORP.

20 W. Chestnut St. • Souderton, Pa.

For more data circle 567 on Postpaid Card

.004" TO 5/32" HOLES DRILLED

with

ECONOMY
SPEED
PRECISION



NEW PLANETARY MICRO-FEED

SPEEDS PRODUCTION
REDUCES BREAKAGE

Planetary Micro-Feed provides 4:1 ratio for very fine quill feed of drills down to .004". Standard feed for drills No. 60 to 5/32". Variable speed control 1,000 to 10,000 or 2,500 to 15,000 RPM. Direct drive motor spindle.

Write for Descriptive Bulletin

The ELECTRO-MECHANO CO.

265 E. Erie St. Milwaukee 2, Wis.

For more data circle 568 on Postpaid Card

new shop equipment . . .

DRY ABRASIVE CUTTING MACHINE

Almost any ferrous or non-ferrous metal can be economically cut by a small, but heavy duty, high speed dry abrasive cutting machine, according to the manufacturer, Allison-Campbell Division, American Chain and Cable Co., Inc., 931 Connecticut Ave., Bridgeport 2, Conn. Designated as the Sever-All Model 1-A and designed for use in metalworking shops, factories, mills, maintenance repair depots and so on, the device has the capacity to cut metals of practically all analyses up to 2 by 2 inch solids, 3 inch standard pipe, 3 by 3 inch angle iron and 4 inch channels. High quality cuts are made at the rate of 3 to 6 seconds per square inch of metal. One of the outstanding features of the Sever-All 1-A unit, which enables it to cut large cross sections with a fine quality cut, is the oscillating action of the abrasive cutting wheel. Because oscillation reduces the arc of contact between the wheel and the work, it provides fast cutting action, clean cuts and, in addition, increased wheel life.

For economical and fast cutting of small cross sections of metal, the Sever-All Model 1-A is operated much like a standard chop-stroke machine. For cutting larger areas, provision has been made for manual oscillation of the cutting wheel by means of a hand lever. This oscillating action reduces the cutting pressure

EVERY TIME YOU MOVE A MACHINE

Barry Machine Mounts CUT MAN-HOURS 90%



In new installations — In relocating machinery — you get savings like these!

3 man-hours instead of 42 man-hours to move machines at Johnson & Johnson

60% saving in new machine installation cost at American Type Founders

No lost production time in moving a complete machine shop at Wyman-Gordon

Barry Leveling Machinery Mounts let you move machines wherever they are needed, and have them in full production in **minutes** — with no delays for drilling, lagging, or shimming.

Write now for the Field Reports that prove these savings — that **you** can get with Barry Machinery Mounts.

BARRY CONTROLS INCORPORATED

BARRY B MOUNT

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

783 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

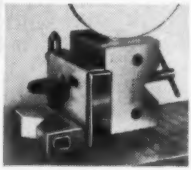
For more data circle 569 on Postpaid Card

LASSY MASTER V-BLOCK

ANGLE PLATES



HARDENED STEEL
New design saves hours of setup time. Assures precise work accuracy to .0001.

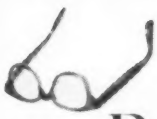


Also ideal as a master for regrinding worn or inaccurate angleplates.

Write for New illustrated catalog on Time Saving Devices

LASSY TOOL CO.
PLAINVILLE, CONNECTICUT

For more data circle 570 on Postpaid Card



Mr. Brandenburg

chose the LeBlond 16" Heavy Duty Engine Lathe (Lathe F). Sorry, we can't give you the names of the other five.

LeBLOND of Cincinnati

The R. K. LeBlond Machine Tool Company
Cincinnati 8, Ohio

World's Largest Builder of a Complete Line of Lathes for More Than 71 Years.

(See "The Case of the Discerning Lathe Buyer," page 82, 83)

For more data circle 571 on Postpaid Card

PRECISION GEARS?

ROLL TEST THEM RAPIDLY – ACCURATELY with the

SCHERR 5" CENTER DISTANCE FINE PITCH GEAR TESTER

Fine Pitch Precision Gears are quickly tested for runout of Pitch Diameter, Spacing and Tooth Form Errors.



Scale Vernier: .0005" Indicator Readings

The New Model is equipped with adjustment of measuring pressure from 4 ounces to 4 pounds

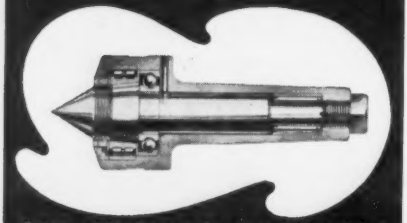
OTHER SIZES OF GEAR TESTERS AVAILABLE UP TO 30".

Send for Illustrated Folder - Code GIKNA

GEORGE SCHERR CO., Inc. 200-MM **LAFAYETTE ST. • NEW YORK 12, N.Y.**

For more data circle 572 on Postpaid Card

NIELSEN
Heavy Duty
Live Centers



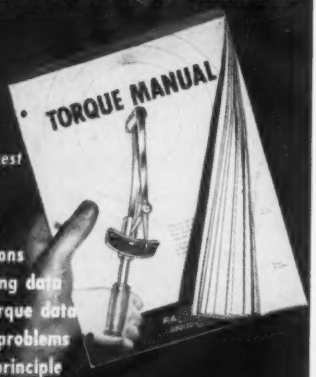
Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

For more data circle 573 on Postpaid Card

"TORQUE WRENCH" MANUAL



Sent upon request

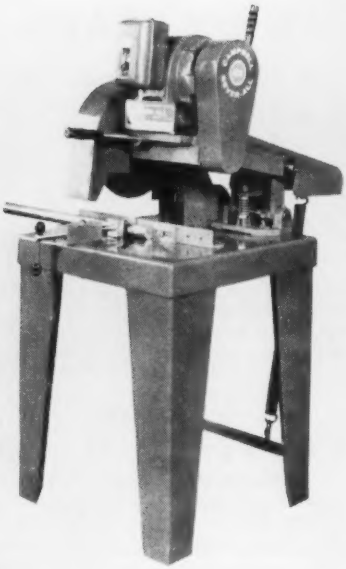
Formulas
Applications
Engineering data
Screw torque data
Adapter problems
General principle

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

For more data circle 574 on Postpaid Card

new shop equipment . . .



Sever-All Model 1-A Cutting Machine

required. Operator fatigue is, thereby, reduced and productivity is increased.
For more data circle 126 on Postpaid Card

★ modern machine shop ★

ROLL FEED FOR BENCH OR FLOOR PRESS

A roll feed, that fits bench or floor type presses up to 7½ ton capacity, is being marketed by Durant Tool Supply Co., Providence 3, R. I. This advanced roll feed assures accuracy on normal or high speed press work and can handle material up to 2 inches in width. It feeds stock up to 1¼ inches in length and accommodates stock up to 0.100 inch in thickness. This unit has roller guides for continuous stock

LOWEST PRICES
Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

Carat	Price
1/4—	$ 2.25
1/2—	4.00
3/4—	6.00
1 —	8.25
1 1/2—	12.00
2 —	16.00



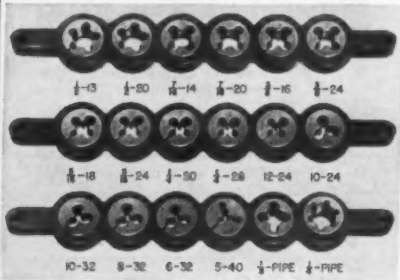
★ These diamonds can be set in any shank to your specification for $1.00 each extra.

★ Prompt resetting service

Allstate Diamond Products, Inc.
Manufacturers of a complete line of diamond tools and wheels
245 W. 27th St., Dept. F, New York 1, N. Y.
CHickering 4-7725
★ Dealers' inquiries invited

For more data circle 575 on Postpaid Card

TIME-SAVER TOOL
CUTS 18 DIFFERENT THREAD SIZES



When your machine or tool is down for the need of a special screw, threaded shaft or rod, this threading tool is ready to cut 18 different size threads, on lathe, drill press or at the vise. Your mechanics will save the time it takes to look for and mount dies in holder.

All orders sent on a 10-day approval basis. Order direct.

Complete set of three holders with 18 adjustable high grade dies, sizes as shown above..... $39

MOHR TOOL & MFG. CO.
BOX 63-H MAYWOOD, ILL.

For more data circle 576 on Postpaid Card

HELIOS Swing-jaw Caliper

For quick, accurate measuring of irregularly-shaped objects where reference point is not on same axis.

HELIOS Dial Caliper

For outside-inside and depth measurements. Full-scale readings of 5", 8" and 10". (Foot with extra Scriber available for conversion to Vernier Height Gage).



Measuring and reading accuracy within .001" guaranteed!
...with fast-reading HELIOS Precision Calipers

HELIOS Precision Calipers are built to last. They are made of high chrome and stainless steel. Wearing parts are hardened. Deeply engraved fine divisions remain clearly visible even after years of service, insure accurate reading.

FREE! For illustrated catalog with data on HELIOS Precision Calipers write today: ▼



NEISE MODERN TOOLS

KARL A. NEISE
Dept. MMS-108, 404 4th Ave.
New York 16, N. Y.

For more data circle 577 on Postpaid Card



TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and 61 - 80 R.H. & L.H.

A properly sharpened drill cuts faster — more accurately and is less likely to break.

Write for circular and full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 578 on Postpaid Card

MARK OF QUALITY

STANDARD MACHINE RACKS

The Standard Steel Specialty Company, a pioneer in the machine rack field, has brought an accuracy and finish to this product that cannot be matched by any other company.

This rack is made from special machinery steel finished to our specification . . . cut by expert mechanics on machines designed especially for this work.

Send for our new catalog which gives information on Woodruff keys, taper pins, machine keys, and features a chart for checking machine racks.

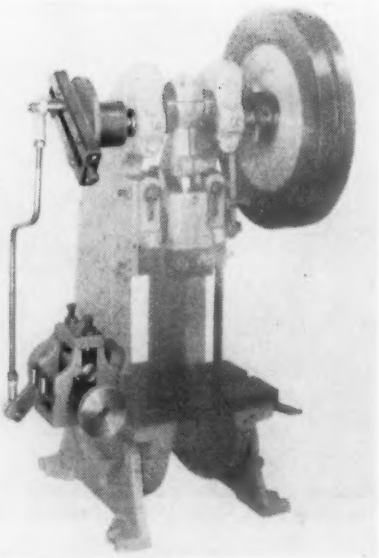
STANDARD STEEL SPECIALTY CO.

BEAVER FALLS • PENNSYLVANIA

***Plants:* Beaver Falls, Pa.; Hammond, Ind.**

For more data circle 579 on Postpaid Card

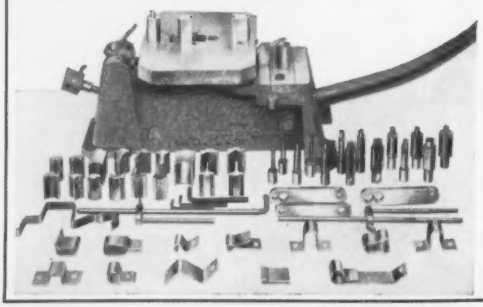
new shop equipment . . .



Durant Roll Feed for bench or floor press

entrance and is supplied complete with a roller lift and screw adjustment eccentric. Furthermore, it has a four contact roller friction clutch, while its bearings and brakes are of solid bronze.

For more data circle 127 on Postpaid Card



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M Kalamazoo, Mich.

For more data circle 580 on Postpaid Card

The *STEVENS* Line SINCE 1925

Introducing NEW series



ROTARY TABLES, 5-7½-8-12-15-18-24" sizes both standard and dial indexing types
ADJUSTABLE TILTING TABLES, #0-1-2
COMPOUND TABLES, #1-2
ROTARY-COMPOUND TABLES, #1-1½-2
INDEX CENTERS—multiple spindle
SPECIAL MACHINES—designed and built.

See your dealer or write for bulletins

The John B. Stevens Company
Main Street, Somersville, Conn., U. S. A.

For more data circle 581 on Postpaid Card



Universal
"FULL-FLO" COOLANT NOZZLES *with* AERATOR
Ask for IPB-Sec. 2A Bulletin

Quality . . . ALL METAL FLEXIBLE HOSE PRODUCTS
UNIVERSAL METAL HOSE CO.
2113 South Kedzie Avenue, Chicago 23, Illinois

For more data circle 582 on Postpaid Card

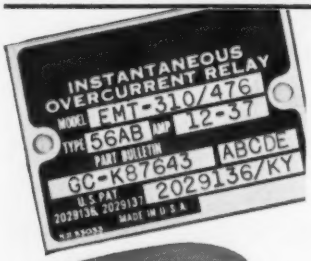
CAMS

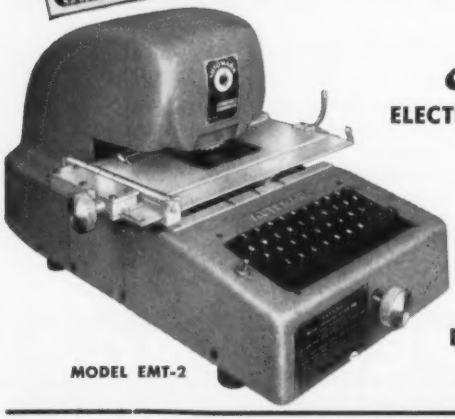
Complete Facilities For
CAM MILLING and CAM GRINDING
To Your Specifications



COLUMBIA CAM CO.
26-07 JACKSON AVE. LONG ISLAND CITY, N. Y.

For more data circle 583 on Postpaid Card





MODEL EMT-2

NOW! MARK NAME PLATES

5 TIMES FASTER

. . . and SAVE . . . SAVE . . . SAVE!

WITH
Automark
ELECTRIC TAG MARKING TYPEWRITER

Just a touch of the finger delivers up to 2 TONS pressure for deep, legible impressions on metal or plastic tags. Standard electric typewriter keyboard — over 100 characters a minute. A modern marvel!

SEND NOW for BULLETIN

DEFIANCE MACHINE & TOOL CO.
1920 S. VANDEVENTER • DEPT. MM
ST. LOUIS 10, MO.

For more data circle 584 on Postpaid Card

new shop equipment . . .

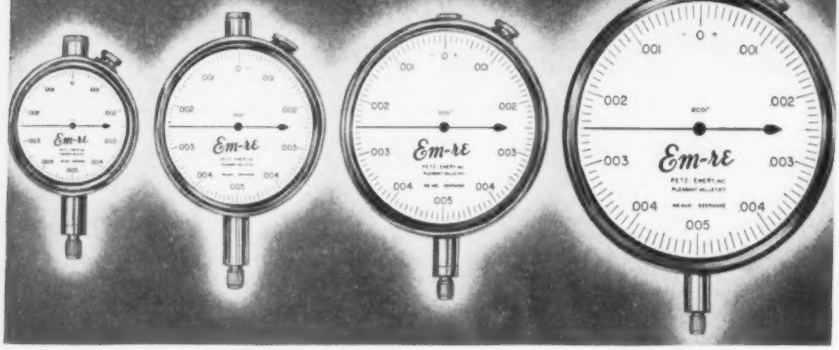
CONTOUR TRANSCRIBER

Non-destructive "sectioning" of contoured parts is said to be possible with a device recently introduced by Optical Gaging Products, Inc., 26 Forbes St., Rochester 11, New York.

Named the OGP Contour Transcriber Model 8-18, the unit makes a permanent record, on specially coated glass, of contours of master patterns, models, dies, molds and similar parts.

The contour reproduction on the coated glass is called a "trace." It is a complete and continuous reproduction of a part contour. Traces can be made of both exterior and interior part contours, top and bottom halves of a die and mating parts. Traces are measured by determining x-y coordinates on conventional contour projectors, by comparing with a grid and by compar-

NOW Em-re Dial Indicator Accuracy Available In A Complete Line



The unmatched performance of "Em-re" Dial Indicators is now available in a **complete** line, including all four A.G.D. groups. This new "Em-re" line of 96 different models provides bezel diameters of 1⅝", 2¼", 2¾" and 3⅝"; 9 ranges from .002" to .250"; graduations in .001", .0005", .00025", .0001" and .00005".

In each of these 96 models you'll find the same new standards of accuracy, repeatability and production life that have made other indicators **obsolete.** For example, "Em-re" .0001" models are accurate to within .00002". That's 1/5 of a graduation. And it will repeat through millions of applications. Each "Em-re" indicator is fully jeweled and completely shockproof over the entire range. Of 31 total parts, 26 are common to all "Em-re" models. Send today for literature on "Em-re" indicators.

SEND FOR CATALOG DF

Patented

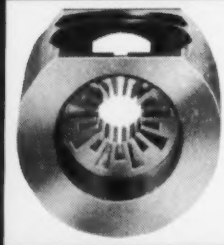
PETZ-EMERY INC.

PLEASANT VALLEY, NEW YORK

For more data circle 585 on Postpaid Card

COLD EXTRUSION HOBBING!

Here At Last!



Intricate Shaped Cavities are Produced by Cold Extrusion to Precision Accuracy . . .

Cavities that would be totally impractical to machine are now produced in a single operation and in any quantity.

Technique applied to copper, aluminum and hobbing steel.

Lower cost—closer tolerances.

Send drawings of your designs for quotation to:

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 586 on Postpaid Card

STUDY.... these outstanding features of the New CHESTERMAN Vernier Height Gage

The Most significant advance in a quarter Century of HEIGHT GAGE DESIGN



Sizes Available
12" - 18" - 24"
40" - 48"

Ask for and Compare our Moderate Prices!

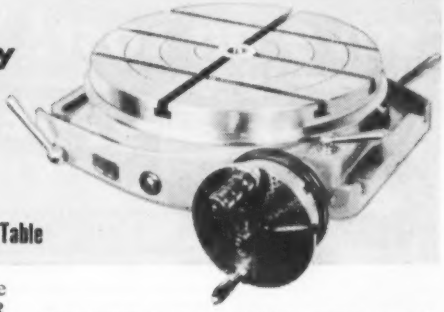
If not available at your favorite Supply House — Write to us for 6-Page ILLUSTRATED FOLDER—Code GIPDU

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200 MM LAFAYETTE STREET • NEW YORK 12, N.Y.

For more data circle 587 on Postpaid Card

- **High indexing accuracy**
- **Exceptional levelness**
- **Accurate center bore concentricity**

. . . the WALTER Precision-Dividing Rotary Table



Circular milling operations which require precision indexing call for WALTER Rotary Tables:

- Easy to read scale with adjustable zero mark. Reading to 6 seconds.
- Precision-ground worm gear in oil assures long-lasting indexing accuracy.
- Ground worm spindle is deeply nitrided for maximum hardness and freedom from wear. No backlash in worm wheel.
- Large graduated drum on worm wheel enables fine setting.
- Clamping levers provide rigid table locking without affecting index setting.

WALTER Rotary Tables come in 10″, 12½″, 15¾″, 19¾″, 25″ and 31″ sizes; with and without dividing discs.

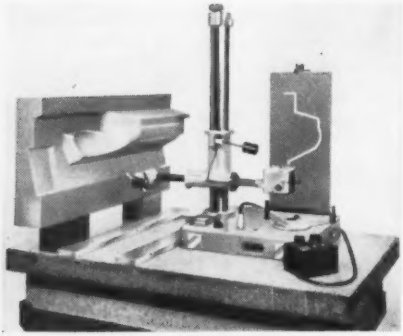
FREE! For illustrated catalog, technical data and test reports, write today:



NEISE MODERNTOOLS

Sole Agents:
KARL A. NEISE
Dept. MMS-108, 404 4th Ave.
New York 16, N. Y.

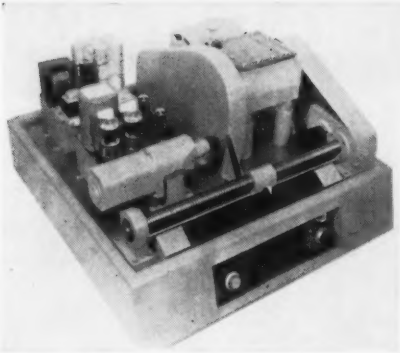
For more data circle 588 on Postpaid Card



Non-destructive sectioning is made possible with this OGP Contour Transcriber

ing to a master outline or reticle. This device handles contours up to 8 inches deep by 18 inches long.

For more data circle 128 on Postpaid Card



Seneca Falls Electro-Mechanical Controls, shown here arranged in a demonstration unit, include (right) mechanical power amplifier, (lower left) displacement transducer and (upper left) electronic amplifier

ELECTRO-MECHANICAL CONTROL SYSTEM

Simplified control systems of improved dynamic response with high

save on cost!

DO THESE JOBS EASIER and FASTER with

SPEEDLAP

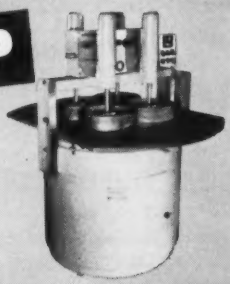


With SPEEDLAP'S rapid stock removal and micro-inch accuracy you can size and finish parts like these minutes faster . . . handle tungsten carbides, ceramics, tough alloys or plastics . . . obtain a 1 RMS finish; flatness and parallelism to 2 millionths of an inch . . . and do it cheaper with unskilled labor. No fixtures are required. There is nothing to dress or resharpen. No cutters or wheels to change.



Ask For Your Copy

Ask for cost and production estimates based on samples of your work. No obligation. (Job lapping service available if desired.)



Water cooled lap base dissipates operational heat to avoid distortion.

Non-chargeable alloy lap plate assures rapid stock removal.

Full wear control maintains constant lap flatness.

Adjustable parts-handling stage loads and unloads parts quickly.

Full pressure air system maintains maximum lapping pressure and raises pressure plates at end of lapping cycle.

ABRADING SYSTEMS COMPANY

8020 NORTH MONTICELLO AVENUE • SKOKIE, ILLINOIS

For more data circle 589 on Postpaid Card



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

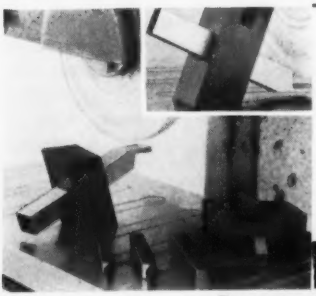
Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4 7/8". ONLY $17.90.

Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

For more data circle 590 on Postpaid Card



SPELLMACO TOOL GRINDING FIXTURE

A quick, easy, accurate way to grind or sharpen a cutting tool.

This fixture can be used for all size bits 1/2" or smaller. No complicated settings to make. Precision ground. Heat treated for long life. Only $9.95 each.

R. L. SPELLMAN CO. • URBANA, OHIO

For more data circle 591 on Postpaid Card

HIGH SPEED PRODUCTION

CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

Ask For Descriptive Booklet And See How You Can Improve Your Production.



WICACO MACHINE CORPORATION

SINCE 1868

4801 STENTON AVENUE
WAYNE JUNCTION, PHILA. 44, PA.

MANUFACTURERS OF

Precision Machinery and Machine Parts
Roller Bearing Twister Spindles—Spindle Oiling Machine —Screw Machine Products.

For more data circle 592 on Postpaid Card

accuracy and assured repeatability have been introduced by Seneca Falls Machine Co., Electronics Division, Seneca Falls, N. Y. These controls, which first found use on tracer lathes, can be applied in a wide variety of other uses including variable and precise speed controls, vibration exciters, process and proportioning controls, servos for aircraft, trucks, automobiles and materials handling equipment. Systems are available for applications requiring ¼ to 100 h.p. The system may be used in conjunction with computors or with signal sources sensing linear motion or distance, pressure, temperature, flow and speed, as well as with manual controls. Components of the system include a signal comparator (electrical or mechanical), a power supply converter, the electronic amplifier and the mechanical power amplifier.

For more data circle 129 on Postpaid Card

★ m m s ★

AUTOMATIC GEAR HOBBER

A fully automatic gear hobbing machine, the Koepfer 170, has been introduced by Cosa Corp., 405 Lexington Ave., New York 17, New York.

The Koepfer 170 can be used for hobbing spur, helical and worm gears; worms; or any similar generated profile. It can be supplied with a maga-

Several of your home appliances probably were gaged with Comtorplug



COMTORPLUG. Interchangeable expanding plugs gage simple or special bores from ⅛" to 10" diameter.

UNIQUE ADVANTAGES

- Large dial with .0001" graduations.
- Indicates actual size, a fixed — not passing — reading.
- Portable — no wire, hoses, stands or electronic gear.
- Positive 2-point gaging — automatic centering.
- Assured accuracy regardless of who operates it.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Will gage work in the machine.
- A shop tool for all-day every day use.

Anybody can use Comtorplug with positive accuracy . . . at machine, bench, lab . . . anywhere, since it's unencumbered by wires, hose, heavy base or electronic gear. The same amplifier fits all plugs and fixed readings show ACTUAL SIZE, front or back taper, ovality, etc. Whatever problem bore you have in mind, COMTORPLUG may be the answer.

COMTOR COMPANY
64 Farwell St.
WALTHAM 54, MASS.



GET THE FACTS — REQUEST BULLETIN 50

For more data circle 593 on Postpaid Card

HIGH SPEED
FLAT TWISTED AND ROLLED SECTION
DRILLS



Unexcelled in Quality and Performance since 1903!

HI-DUTY *Flat-Twisted* and *Rolled Section* Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from ½" to 3¼" and larger. Milled type drills are also available—from 1/64" to ½" diameter. Hi-Duty means long lasting economical service!

SPECIAL DRILLS

We manufacture a large variety of *special types* of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY...

We can make immediate shipment from stock on many special drills! *Contact your Industrial Supplier or write today for Catalog and Price List.*

HI-DUTY DRILL WORKS

FLEETWOOD, PENNSYLVANIA

For more data circle 594 on Postpaid Card

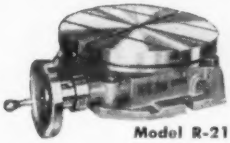
TROYKE

ROTARY TABLES

New Design

Greater Precision

Greater Rigidity



Model R-21

6 Sizes • 8 Models

Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .00087" at 6" diameter.)

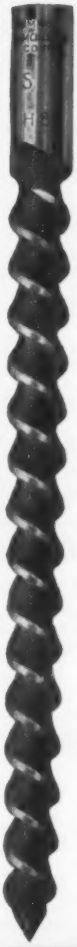
Write for FREE Catalog Number 23.

TROYKE MFG. CO.

11296 Orchard Street
Cincinnati 41 (Sharonville), Ohio

For more data circle 595 on Postpaid Card

4 Reasons why you should use GAMMONS DIE REAMERS



- Specially treated for today's modern die steels.
- Rapid cutting capacity.
- Tapers per inch .005, —.008, —.013 in stock.
- Large range of standard sizes in stock at all times for your convenience.

WRITE FOR COMPLETE INFORMATION

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pins, chucking, die makers and special reamers.

For more data circle 596 on Postpaid Card

zine feed attachment providing fully automatic loading, chucking and machining. As a result, handling time is considerably reduced. The operator need only load the magazine and check finished pieces, enabling him to operate several machines. For small runs, the machine can be operated semi-automatically, in which opening of the chucking device can be controlled by a foot pedal. The unit can be



Koepfer 170 Automatic Gear Hobbing Machine

equipped with a manufacturing program control, providing preselection by control switches for either longitudinal hobbing, plunge hobbing or combined plunge-longitudinal hobbing.

For more data circle 130 on Postpaid Card

MICRO DRILLS

from 0.002" — 0.040". Spiral and Flat in highest precision. Ground from the solid and hardened rod. Made from Super HSS. Supply from stock.

H. KAPP ENGINEERS

110-07 66th Rd. • Forest Hills, L. I., N. Y.

For more data circle 597 on Postpaid Card

GRIND: RADIUS—ANGLES

QUICKLY—on your SURFACE GRINDER—EASILY

RADIUS DRESSER $44.00

Diamond $8.00



ORDER DIRECT on our 10 day money back guarantee

ANGLE DRESSER $49.00

Diamond $8.00



Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops. All surfaces ground true from hole. CAPACITY—1½" convex to 4" concave.

10" Wheel size for DoALL and NORTON Grinders—$49.00. Diamond $8.00.

14", 20", 24", in stock, low price.

Ball Thrust Bearing.— 24 Precision Ground Surfaces. — DIAMOND BLOCK Slides In Ground & Lapped Housing, Can't Chatter. — Set Accurately With Protractor or Sine Bar to 1" of Arc. Largest Bearing Surfaces of Any Angle Dresser.

The "Mighty Midget" Line

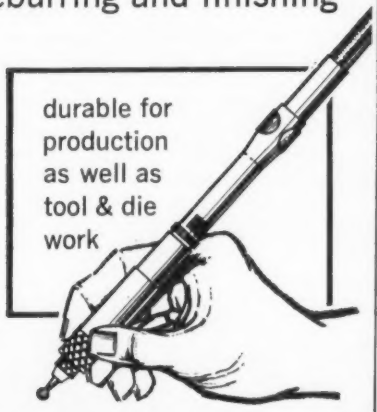
SPERMAN METAL SPECIALTIES • 2199 E. 21st ST. • BROOKLYN 29, N. Y.

For more data circle 598 on Postpaid Card

FOREDOM

FLEXIBLE SHAFT MACHINES

designed especially for lighter duty precision deburring and finishing



Every Foredom's a little powerhouse, yet handles like a fountain pen. That's why jobs go faster! Choose for your special purpose from an unusually wide variety of interchangeable handpieces.

Thousands of Foredoms in use for over 35 years in toolrooms, for production and maintenance. Bench and hang-up models.

SINCE 1933 SERVICE DEPENDABILITY

Finest you can buy—and your industrial distributor will supply. Catalog on request to dept. N-4.

FOREDOM ELECTRIC COMPANY

27 Park Place, New York 7, N.Y.

For more data circle 599 on Postpaid Card

Buy DURANT

PRESS ROOM EQUIPMENT

WIRE STRAIGHTENERS
Takes round or flat wire and tubing. Rolls adjustable by means of socket set screw. For use with automatic Slide, Roll or Hitch Feeds. Units available with 5, 7, 9 or 11 grooved rolls.

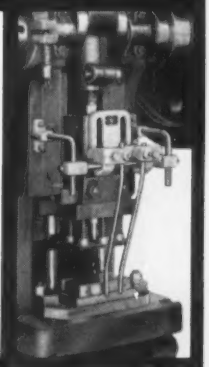


MOTOR DRIVEN STOCK STRAIGHTENERS
For all thin materials. Entering rolls power driven; top rolls are individually adjustable for stock thickness. Available in eight sizes.



SWEEP GUARDS
A positive safety guard on power presses. Easily installed. Downward motion of ram removes operator's hands. Rugged—withstands jarring impact of press. Needle bearings in guard housings assures long life.

Write Now for new catalog showing prices and complete line of Equipment.



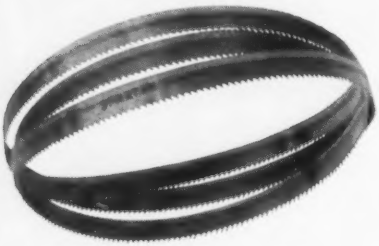
DURANT Tool Supply Co.

9 Thurbers Ave., Providence 5, R. I.

For more data circle 600 on Postpaid Card

They Cut So Fast-
Yet Last So Long

Spartan
BAND SAWS



Furnished in Die Cutting, Skip Tooth, Hook Tooth, Flexible Metal Cutting and High Speed Cutting Styles.

Spartans give increased efficiency, faster production and greater economy in metal cutting.

INDUSTRIAL DISTRIBUTORS
SERVING INDUSTRY ECONOMICALLY
THE RIGHT HAND OF PRODUCTION

Distributors everywhere stock Spartans

SPARTAN SAW WORKS, INC.
SPRINGFIELD, MASS.

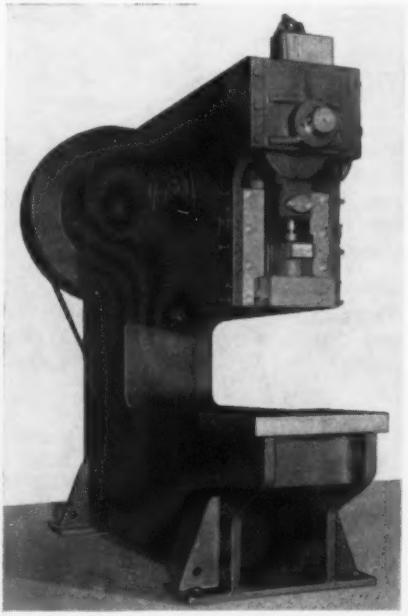
For more data circle 601 on Postpaid Card

new shop equipment . . .

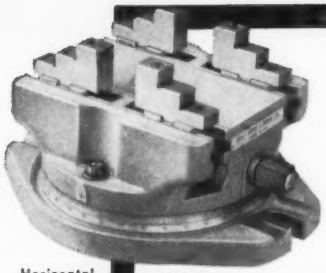
DEEP THROAT PUNCH PRESS

A deep throat punch press, built by Verson Allsteel Press Co., 9310 South Kenwood Ave., Chicago 19, Ill., has been designed for use in railroad car shops to perform multiple punching operations on large sheets.

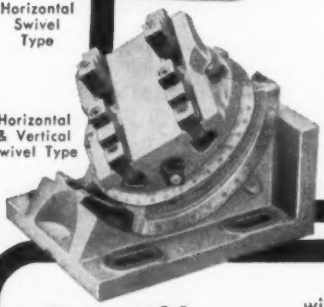
Of all steel welded construction and weighing approximately 17,000 pounds, this press has a depth of gap of 60 inches from centerline of slide to back of gap at the frame. Capacity is 50 tons. Slide area is 10 by 12 inches; stroke is 2 inches. The machine is equipped with mechanical clutch and brake unit, square type gibs and automatic lubrication system. The press requires approximately 40 by 120 inches of floor space and is 115 inches



Verson Allsteel Deep Throat Punch Press



Horizontal Swivel Type



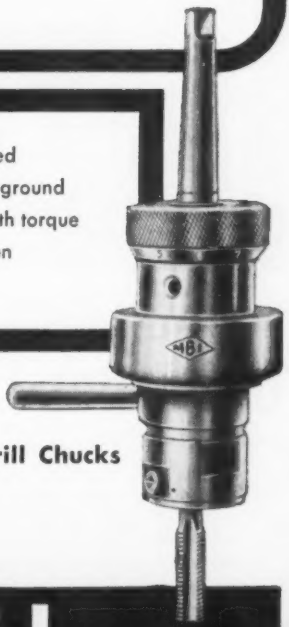
Horizontal & Vertical Swivel Type

Multi-Purpose Vises

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Rigid in any position. Various capacities and extra soft jaws available.

Reversible Safety Tapping Attachments

with adjustable graduated friction drive, hardened, ground and lapped, complete with torque bar and handles. Precision made throughout.



Tested for Performance to American Standards

ALSO AVAILABLE:

- **Dial Vernier Calipers • Keyless Drill Chucks**
- **Quick Change Chucks & Collets**

Immediate Delivery From N.Y. Stock.

DISTRIBUTOR INQUIRIES INVITED

MBI

Write for Descriptive Booklet and prices.

Our Headquarters in New York City



M.B.I.
export & import ltd.

A Division of Machinery Builders Inc.

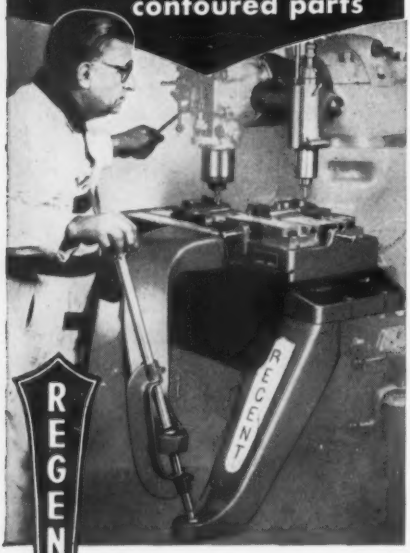
475 GRAND CONCOURSE, BRONX 51, NEW YORK

Phone: MOtt Haven 5-0900

"Over 25 years experience in designing and building machinery"

For more data circle 602 on Postpaid Card

FASTER PRODUCTION
of PRECISION CAMS,
O-RING GROOVES
& hundreds of other
contoured parts



2 or 3 dimensional
FLUID MOTION
Duplicator Tables

Fastest Profile Milling and Duplicating

Save up to 50% and more machining time on contoured parts with both the R-200 and R-300 models. Single-lever control allows operators to duplicate complex parts in a fraction of the usual time.

R-200 — 2-Dimensional Profiler for any vertical miller
R-300 — 2- and 3- Dimensional for Bridgeport millers
Capacity: 6" x 6" (7" x 6" Special)
1 to 1 ratio with master

For literature write to
J. M. KALINS & COMPANY
1579 Railroad Ave., Bridgeport, Conn.
For more data circle 603 on Postpaid Card

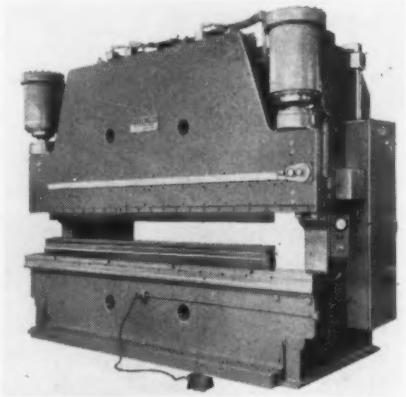
in height. Floor mounted, it requires no pit for installation.
For more data circle 131 on Postpaid Card

★ modern machine shop ★

HYDRAULIC PRESS BRAKES

A line of hydraulically operated Steelweld Press Brakes has been developed by The Cleveland Crane and Engineering Co., 6468 East 281st St., Wickliffe, Ohio, and is now available in various capacities up to 2,000 tons for bending mild steel, from 10 gauge to 2 inches and in lengths to 30 feet.

These hydraulic brakes have advantages which are hoped will meet with wide appeal among press users. Some of the important ones are: no overloading; long constant power stroke; reversing ram; adjustable stroke length; two speeds standard; fast approach and quick return; tonnage adjustment; ram stays level; tapering ram; and simplicity of operation.
For more data circle 132 on Postpaid Card



Steelweld Hydraulic Press Brake

Tough Grinding Wheel Forms Dressed Easy as A, B, C

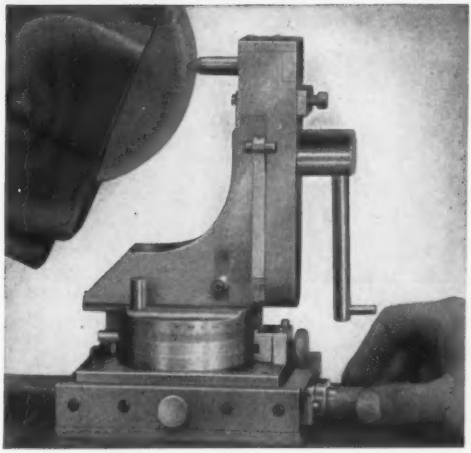
eliminate elaborate set-ups and operations

.0001" ACCURACY

Fluidmotion

WHEEL DRESSERS

dress two angles tangent to a radius in one continuous motion



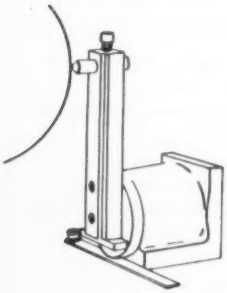
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

A. Obtain micrometer reading; add required convex radius or subtract required concave radius.

B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.

C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

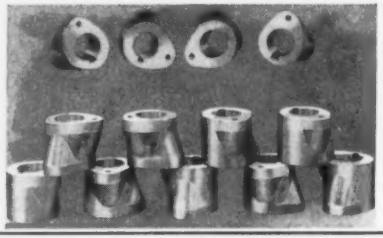
See your industrial distributor or write for free literature.

WHEEL DRESSERS · J&S TOOL CO. INC. · JAW CLAMPS · PRECISION VISES · DOWN-HOLDING DEVICES **CLAMPCUT** · SINE BARS ·

J & S TOOL CO., INC. | **871 DORSA AVE. LIVINGSTON, NEW JERSEY**

For more data circle 604 on Postpaid Card

We'll make the cams you need



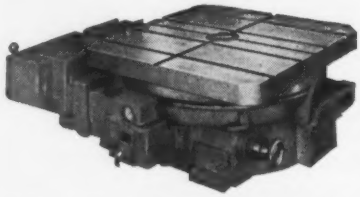
Rowbottom for Cams

Investigate!

If you need cams in any type... box, barrel, side or cams hardened and ground... or rotary profiling service...get the benefit of Rowbottom's long, specialized experience and complete service. We'll produce your cams or furnish the machines for making them. All types in any quantity. Send us your specifications.

THE ROWBOTTOM MACHINE CO.
P. O. Box 4097, Waterbury, Conn.

For more data circle 605 on Postpaid Card



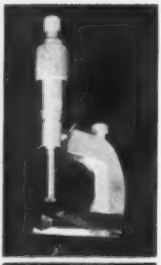
FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36″ and 50″ square or round. *Power rotary* and *power feed:* 36″, 50″, 60″, and 72″ square or round. Special tables built to your requirements. For complete descriptions and specifications, *write for Bulletin 854.*

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle 606 on Postpaid Card

WHAT INDUSTRY HAS BEEN WAITING FOR!





REVOLUTIONARY features in Swiss-made micrometers and Vernier calipers.

- **Greater speed**
- **Greater efficiency**

SAVES TIME — SAVES MONEY

MICROMETERS: 0-1″, 0-2″ and 0-3″, reading .0001.

- 6 Interchangeable anvils for all-purpose application.
- *Anvils can be rotated a full 360° on a plane parallel to measuring surfaces.*

VERNIER CALIPERS: 10″ and 7″, reading .001.

- *Have amazing hinged lower jaw, swinging 180° and 360°, respectively, making measurement between points on two different axes as easy as between points on a single axis.*
- Have scales for angular measuring.
- Graduation photographically etched.
- Jaws have broad surface, affording sure and firm grip.
- Made of the finest tempered stainless steel, these instruments symbolize the ultimate in Swiss craftsmanship.

Write for literature and prices.
Areas still available for representatives.

POLYPLAN Co. · 45 West 81st St. · New York 24, N. Y.
Tel.: SUsquehanna 7-8220 . . . . . Cables:POLYPLAN

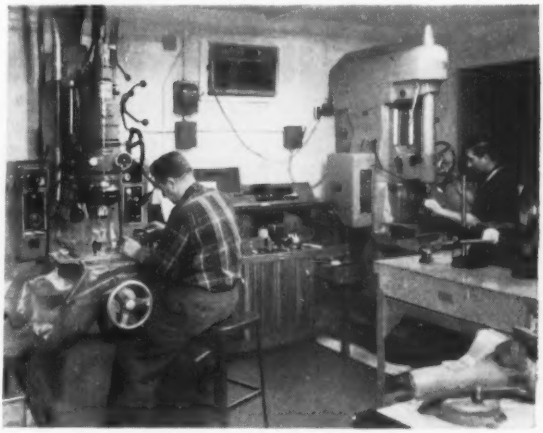
For more data circle 607 on Postpaid Card

Ernest Olds tells how Moore Jig Borer and Jig Grinder Help "Broaden Our Scope of Precision"

This is another in a series featuring the views of leading tool and die companies



by **ERNEST E. OLDS,** General Sales Manager
Size Control Company, Chicago, Illinois
Manufacturers of gages and lapping machines



MOORE JIG GRINDER (left) and Moore Jig Borer team up in this dust-free temperature controlled room at Size Control Company. Under such conditions they have held hole location tolerances to .00005".

"We at Size Control Company find it absolutely necessary to broaden our scope of precision to meet the increasing needs of our customers. This calls for holding close limits on location as well as our usual tolerances on diameters.

"The Moore Jig Borer and Jig Grinder is our answer! In use, these machines give amazing, practical flexibility to establish extreme accuracy with repeated confidence.

"The Moore Jig Borers and Jig Grinders which we are now using are in a special temperature controlled room. They have held tolerances as close as .00005" with comparative ease. They are used in conjunction with electronic gages, which re-inspect the results of the Borer and Grinder and act as a double-check for accuracy."

In addition to maintaining close tolerances for tooling accuracy, Moore Jig Borers are designed for economical, high-precision production operations. Moore Jig Grinders prove their mettle in the finish-grinding of intricate contour shapes and holes. For literature describing the unique features of both these toolroom time- and cost-cutters, just write...

MOORE SPECIAL TOOL COMPANY, INC.
730 Union Avenue, Bridgeport 7, Connecticut



HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. $5 in U. S. A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

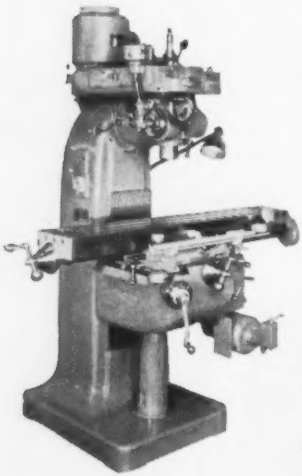
For more data circle 608 on Postpaid Card

Produce MORE... Produce it BETTER!

ON THESE IMPROVED ECONOMICAL

INDEX VERTICAL MILLS

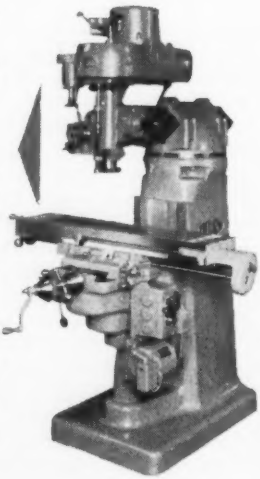
Super "55" MILL



1½ HP Head or cptional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use . . . No need to reindicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

"45" MILL



INDEX MACHINE CO.

544 N. MECHANIC STREET JACKSON, MICHIGAN

For more data circle 609 on Postpaid Card

EXCLUSIVE . . .

FOR BETTER THREADING



Highest quality threading at lowered costs are yours, with Hanson-Whitney's exclusive *"Finished after hardening"* Process. H-W's entire line of Multiple Thread Milling Cutters are manufactured by this unique process, providing you with these cost-cutting quality features:

- **Finest Thread Finish**
- **Closest Tolerances** — in tooth spacing, form and relief.
- **Minimum O.D. Runout**
- **Minimum Variation** — from parallelism and desired taper, permits quality threading to longest feasible length.
- **Uniform Tooth Clearance** — assures maximum cutter life.

Hanson-Whitney home and field specialists are always available to recommend practical solutions to *all* your threading problems. And you can count on nation wide Hanson-Whitney Stocking Distributors to provide fast, complete service.

Write for literature.

Hanson-Whitney
COMPANY

Division of Whitney Chain Company

206A BARTHOLOMEW AVENUE
HARTFORD 2, CONNECTICUT

TAPS • THREAD GAGES • HOBS • CENTERING MACHINES • THREAD MILLING MACHINES AND CUTTERS

For more data circle 610 on Postpaid Card

where to get it

Numbers shown are the page numbers of advertisements and new equipment write-ups which appear in this issue.

A

Abrasives, Grain, Cloth, Paper, Disc, etc., 50, 51, 57, 63, 68d
Accumulators, 57
Actuators, 84d
Adapters, 157, 253
Agitators, 287
Air Operated Equipment
(Look for specific item)
Alloys, 248, 251
Amplifiers, 174
Arbors, 218, 246
Assembling Machines, Special, 291
Automated Equipment
(Look for specific item)

B

Bags, Shipping, 241
Bar Machines, Automatic, 76
Bearings, Ball, 41, 44
Bearings, Bronze, 199
Bearings, Roller, 41, 44, 237
Bearings, Sleeve, 44
Bearings, Thrust, 41
Bending Devices, 248, 260
Bending Machines, 196
Blocks, V, 234
Books, 237
Boosters, 192
Boring Bars, 13, 20, 279
Boring Heads, 13, 211, 250
Boring Mills, 20, 61, 88
Brakes, Press and Bending, 68b, 68c, 132, 133, 206, 272
Broaches, 48, 84c
Broaching Kits, 48
Broaching Machines, 36
Bronze Bars, 199
Bushings, Brass, Bronze, etc., 199
Bushings, Drill Jig, 37, 49, 84d, 233, 289

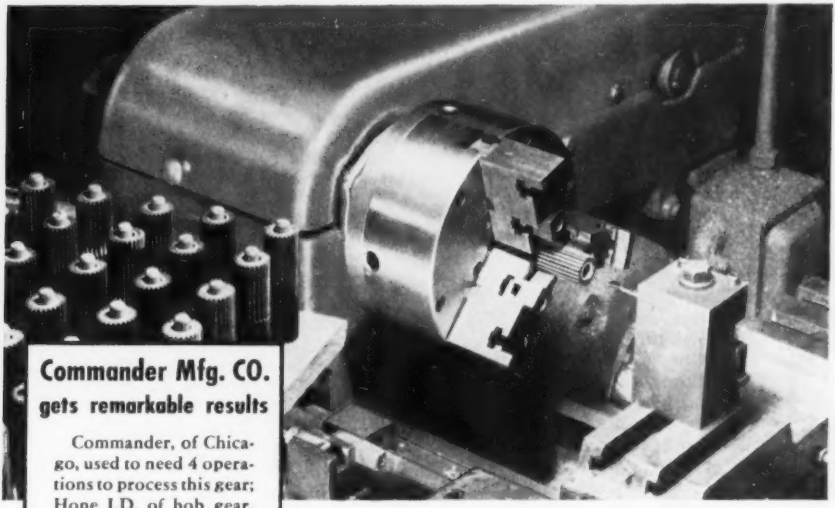
C

Calipers, 259, 271, 274
Cam Making Machines, 274
Cams, 219, 227, 236, 261, 274
Carbides, 77
Centering Machines, 277
Centers, Bench, 181, 244
Centers, Index, 261
Centers, Lathe, Planer, Miller, etc., 59, 230, 233, 235, 246, 252, 258
Chains, 44
Chamfering Machines, 196
Chilling Equipment, Industrial, 43
Chucking Fixtures, 226
Chucks, Air and Hydraulic, 68a
Chucks, Collet, 60, 246, 271
Chucks, Drill, 230, 238, 271
Chucks, Gear, 279
Chucks, Keyless, 141, 194
Chucks, Lathe, 64
Chucks, Magnetic, 64, 188
Chucks, Scroll, 279
Chucks, Universal, 64, 247, 249
Circulators, 287
Clamp Components, 193
Clamps, 33, 193, 273
Coil Handling Equipment, 164
Collectors, Mist, 217
Collets, 246, 271, Inside Back Cover
Comparators, 62, 97, 179, 236
Control Systems, 100, 264
Controlling Devices, 62, 67
Coolant Units and Systems, 167, 245
Coolants, 228
Countersinks, 45, 170, 242, 250
Couplings, 44
Covers, Protective, 208
Creams, Industrial, 65
Cut-Off Machines, 39, 74, 213, 256
Cutters, Deburring, 242
Cutters, Gear, 143
Cutters, Inserted Blade and Tooth, 143, 149

Unique *Buck* GEAR Chuck

Holds wide range of diameters within .0005″ on pitch line

(LOGAN Lathe in Photo)



Commander Mfg. CO. gets remarkable results

Commander, of Chicago, used to need 4 operations to process this gear; Hone I.D. of hob gear, grind O.D. of gear on arbor, press in oilite, use pot chuck on O.D. to bore oilite to .0004″ tolerance.

The Buck gear chuck eliminated operations 1 and 2, speeded up 4 by 40%. Tolerance was held, scrap entirely ended. The former problem of runout from pitch diam. to I.D. was licked—it is now held to .001″ with production of 70 to 85 pieces per hour.

Brings new flexibility, new low cost to gear I.D. boring and grinding

You see here the *only* chuck that gives you broad capacity in holding gears of different diameters—and holds them *within .0005″ precision* on the pitch line. It's a combination of the Buck DUST-PROOF chuck and its master jaws (with full center hole capacity) plus angulate jaws to fit gear teeth. As with every Buck chuck development it is logical, it is simple, *it works*, and the cost is but little more than the standard Buck chucks.

Send for complete details. See why, more than ever, *"It pays to chuck with Buck."*

The Buck line includes Scroll, Dust-Proof, Power, Independent chucks, Boring Bars.

BUCK TOOL COMPANY

1014 SCHIPPERS LANE • KALAMAZOO, MICH.

For more data circle 611 on Postpaid Card

Cutters, Keyway, 222
Cutters, Milling, 143, 149, 239, 249, 277
Cutters, Special, 242
Cylinders, Hydraulic and Pneumatic, 68a, 159, 188

D

Deburring Machines, 196
Demagnetizers, 64, 67
Diamond Compounds, 19
Diamonds and Diamond Tools, 259
Die Casting Machines, 231
Die Heads, 201
Die Making Machines, 46, 47
Die Sinking Machines, 10, 11
Dies, Press Brake, 206
Dies, Punching or Forming, 8, 31, 56, 95, 231
Dividing Heads, 64, 174, 254
Dressers, Grinding Wheel, 241, 259
Dressing Fixtures, Grinding Wheel, 33, 182, 268, 273, 275
Drifts, Drill, 246
Drill Heads, 194, 197, 216, 222, 241
Drill Jigs, 59
Drill Pointers, 46, 47
Drill Rod, 215
Drill Sharpening Fixtures, 260
Drilling Machines, Bench, 213, 255
Drilling Machines, Radial, 80, 81
Drilling Machines, Sensitive, 80, 81, 190, 216
Drilling Machines, Vertical, 80, 81, 213, 285
Drilling and Tapping Machines, Combination, 192
Drilling Units, 135
Drills, Center, Core, Twist, etc., 95, 143, 170, 221, 224, 230, 243, 247, 267, 268
Drills, Portable Electric, 57
Drills, Portable Pneumatic, 240
Duplicating Machines, 40, 69
Dust Control Equipment, 217, 218, 248

E

End Finishing Machines, 196
End Mills, 68, 95, 98, 143, 239

F

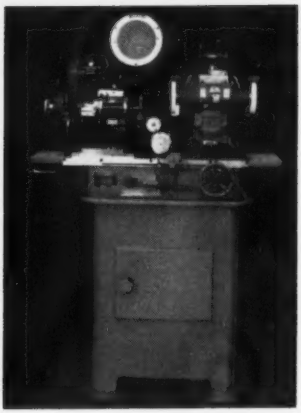
Fabricators, 69
Facing Heads, 20
Feed Fingers, Inside Back Cover
Feed Units, 258, 291
Feeler Gage Stock, 161
Felt Parts, 204
Files, 242
Files, Rotary, 235
Filters, 205
Flexible Shaft Equipment, 57, 269
Fluids, Cutting, 71, 72, 73
Forming Machines, 34, 74
Furnaces, Heat Treating, 91, 208, 209, 233

G

Gage Accessories, 191
Gages, 62, 66, 97, 99, 142, 182, 184, 191, 263, 266, 277
Gear Testing Machines, 257
Gears and Gear Units, 44
Generators, 214
Greases, 190
Grinders, Cutter and Tool, 10, 11, 40, 46, 47
Grinders, Cylindrical, 50, 51
Grinders, Drill, 260
Grinders, Face Mill, 46, 47
Grinders, Hand, 135
Grinders, Jig, 8, 31, 80, 81, 275
Grinders, Portable Electric, 57
Grinders, Portable Pneumatic, 237, 240
Grinders, Snagging, 252
Grinders, Surface, 12, 15, 93, 169, 175, 207
Grinders, Swing Frame, 231
Grinders, Tool Bit, 46, 47
Grinders, Tool Post, 135
Grinders, Valve Face, 57
Grinding Fixtures and Attachments, Front Cover, 93, 167, 265, 281
Grinding Wheels, 50, 51, 63, 96, 105, 175
Guards, Press, 269

H

Hammer Molds, 241
Handles, Machine, 186
Hardness Testing Devices, 173, 232, 243, 246
Hinges, 245
Hob Sharpening Machines, 146, 147
Hobbers, Gear, 88, 266
Hobbing Machines, 146, 147
Hobs, 95, 143, 146, 147, 277
Holders, Bit, 163
Holders, End Mill, 157
Holders, Floating, 223
Holders, Tool, 13, 59, 223
Holders, Wire, 214
Holders, Work, 250
Honing Machines, 27, 30, 42, 204

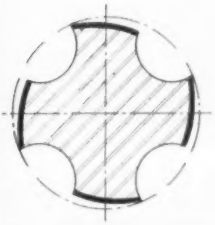


Front Cover News!

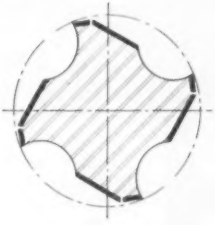
See front cover—Here's the R-O shown equipped for the first time with two major accessories which have been added in 1958; the new optical comparator and the new foot operated air chuck. Now along with precision control of the grind you get rapid visual inspection and rapid tool interchange.

R-O LEAVES MAXIMUM METAL BEHIND THE EDGE TO SUPPORT IT

**—Grinds from edge to heel,
eliminates feathers,
gives a keener, longer lasting edge**



Because you've never used a tool ground other than like the one at the left, don't decide it's the only, the best or least expensive method of sharpening. R-O will cut perishable tool costs by giving you more cuts per grind—better cuts, too!



Sharpen step drills, reamers, form mills, center drills, boring tools, etc. Grind flats, hexes, ellipses, cams, etc. from the solid. R-O may be the answer to a job you are struggling with.

RO
UNIVERSAL
FORM RELIEVING
FIXTURE

R-O Grinder

GRINDER DIVISION
Royal Oak Tool & Machine Co.
29800 Stephenson Highway
Royal Oak, Michigan
Please forward your R-O catalog
Firm_____
Address_____
City-State_____
Per_____

For more data circle 612 on Postpaid Card

Hose Assemblies, Coolant, 261
Hydraulic Equipment
(Look for specific item)

I

Indicators, 62, 66, 171, 191, 262

J

Jaws, Chuck, 89
Jaws, Faceplate, 68a
Jig Borers, 80, 81, 179, 275
Jigs and Fixtures, 37, 134
Joints, Universal 44, 222

K

Keys, Machine, 210, 260
Keys, Woodruff, 210, 260
Keyway Cutting Machines, 246
Knurls, 200

L

Lapping Machines, 19, 264
Lathes, Bench, 88
Lathes, Engine and Toolroom, 21, 26, 29, 61, 82, 83, 103, 183, 257
Lathes, Speed, 172
Lathes, Tracer, 16, 17
Lathes, Turret, 5, 9
Layout Materials, 223, 227
Lifting Machinery, Portable, 209, 228, 255
Lighting Equipment, 251
Lubricants, 190, 211

M

Machining Units, Portable, 135, 253
Magnifiers, 226
Marking Devices, 198, 200, 212, 235, 236, 261
Measuring Instruments, 66
Metallizing Equipment, 189
Micrometers, 274
Microscopes, 180, 229
Milling Attachments, 20, 25, 167, 235
Milling Machines, Automatic, 178
Milling Machines, Hand, 58, 202
Milling Machines, Horizontal, 6, 10, 11, 40, 58, 186
Milling Machines, Thread, 277
Milling Machines, Turret, 25
Milling Machines, Universal, 6, 10, 11, 61
Milling Machines, Vertical, 10, 11, 40, 276
Mills, Hollow, 227
Mills, Midget, 242
Mountings, Machine, 256

N

Nibblers, 38, 212, 255
Notching Units, 140

O

Oil Groovers, 265
Oiling Machines, 265
Oils, Grinding, Inside Front Cover
Oils, Hydraulic, 84
Oils, Lubricating, Inside Front Cover
Ovens, 233

P

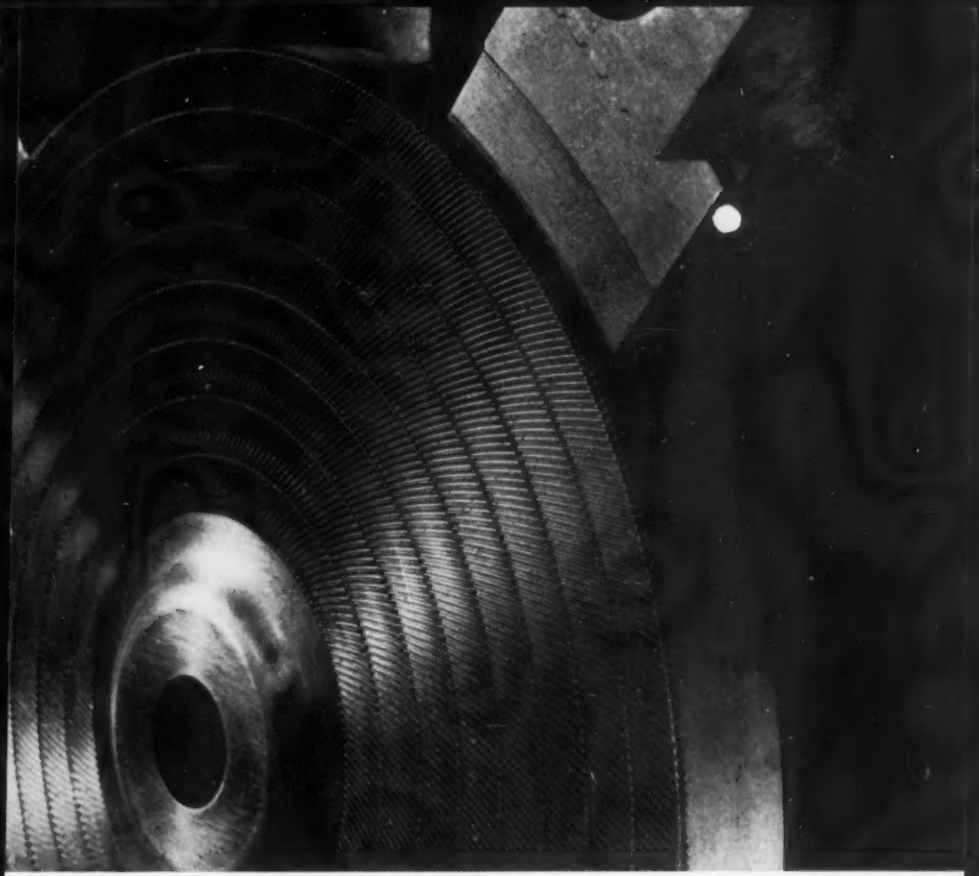
Pantographs, 40
Parallels, 207
Parts, Machine Tool, Production, Aircraft, etc., 37, 84d, 199, 230, 265
Pillow Blocks, 44
Pins, Dowel, Taper, etc., 210, 215, 260, 267
Planer-Millers, 246
Plates, Angle, 207, 234, 257
Plates, Floor, 234
Plates, Sine, 249
Plates, Surface, 207, 234
Plates, Tool and Jig, 35
Polishers, Portable Electric, 57
Power Units, Hydraulic and Pneumatic, 84b, 159
Presses, Arbor, 239
Presses, Hydraulic, 239
Presses, Power, 18, 132, 133, 165, 168, 198, 203
Presses, Punch, 229, 270
Profiling Machines, 176, 220
Pumps, Coolant and Lubricant, 287
Pumps, Hydraulic, 170
Pumps, Molten Metal, 287
Punches, 56, 231, 265
Pyrometers, 164

Q

Quills, 56, 167

R

Racks, Machine, 260
Reamers, 95, 143, 146, 147, 230, 242, 267
Rectifiers, 64, 67
Refractories, 50, 51
Removers, Chip, 227
Rings, Retaining, 181



NE PATTERN on 11" diameter "plunger" forms molding surface for press to make abrasive wheels. The Carborundum Company.

Airkool-S retains precise size and shape through heat treatment

Forming this precise pattern is easily accomplished with Airkool-S, a tough, sulphur-bearing, air-hardening tool and die steel with good machinability. Its excellent nondeforming properties are important too, because this pattern must be retained, without distortion, through heat treatment.

Because Crucible Airkool-S is consistently uniform and clean, no objectionable irregularities appear on this fine pattern. Furthermore, Airkool-S is much more abrasion resistant than typical oil-hardening tool steels, and is substantially tougher than high-carbon, high-chromium types.

Stocks of Airkool-S and dozens of other special tool steels are maintained in all Crucible warehouses—in a wide range of sizes. *Crucible Steel Company of America, Dept. TJ11, The Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE STEEL COMPANY OF AMERICA

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

For more data circle 613 on Postpaid Card

Rings, Truing, 59
Riveting Machines, 219, 245
Rolls, 74

S

Sanders, Portable Electric, 57
Sanders, Portable Pneumatic, 240
Sanding Machines, Belt and Disc, 247
Saw Blades, Band, 55, 79, 85, 210, 270
Saw Blades, Hack, 24, 55, 79, 85
Saw Blades, Hole, 75
Saw Blades, Power, 79, 85
Saw Frames, Hack, 79, 85
Saw Sharpening Machines, 186
Sawing and Filing Machines, Combination, 177
Sawing Machines, Band, 180, 238, 240
Sawing Machines, Hack, 24, 64
Saws, Portable Electric, 57
Screw Drivers, Portable Electric, 57
Screw Drivers, Portable Pneumatic, 57
Screw Driving Machines, Power, 291
Screw Machines, Automatic, 22, 23, 40
Screws, Cap, Set, Socket, and Machine, Back Cover
Screws, Transfer, 219
Segments, Grinding, 175
Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, etc., 8, 14, 31, 41, 162, 170, 219, 227, 236, 239, 241, 243, 249, 253, 261, 263, 264, 274
Shearing Machines, 132, 133
Shears, Hand, 233
Shim Stock, 161
Shims, 161
Sine Bar Fixtures, 33, 54, 249, 273
Sleeves, 231, 246
Slitting Machines, 34, 74
Sockets, 246
Spacers, 161
Spacing Collars, 161
Special Machinery, 8, 31, 211, 261
Speed Reducers, 44, 244
Spindles: Grinding, Boring, Milling, etc., 13, 14, 52, 84a, 242, 265, 292
Spring Winders, 187
Springs, 184
Sprockets, 44
Steel, Die, 32, 101, 283
Steel, Stainless, 53
Steel Stock, Ground Flat, 101, 215
Steel, Tool, 32, 234, 283
Stops, Collet, 154
Straightedges, 207, 234
Switches, 64

T

Tables, Duplicating, 272
Tables, Elevating, 155
Tables, Rotary and Index, 8, 20, 31, 217, 225, 235, 261, 263, 267, 274, 275
Tapes, Pressure Sensitive, 50, 51
Tappers, Automatic, 241
Tappers, Hand, 237, 253
Tapping Attachments, 202, 241, 271
Tapping Heads, 185, 194, 197, 202, 216, 222, 241
Tapping Machines, 78, 153
Tapping Units, 135
Taps, 28, 86, 95, 142, 277
Thread Rolling Heads, 87
Threading Attachments, 4, 241
Tool Bits, 163
Tools, Balancing, 219
Tools, Boring, 146, 147, 239
Tools, Carbide, 95, 99, 143
Tools, Chamfering, 146, 147
Tools, Fabricating, 203
Tools, Facing, 146, 147, 239
Tools, Form, 200
Tools, Internal Threading, 239
Tools, Lapping, 154
Tools, Nut Running, 163
Tools, Recessing, 139, 196
Tools, Reciprocating, 254
Tools, Screwdriving, 163
Tools, Threading, 200, 259
Tracing Devices, 262
Tube Mills, 34, 74
Turning Fixtures, Radius, 243
Turrets, Lathe, Tool Post, Bed and Tailstock, 220

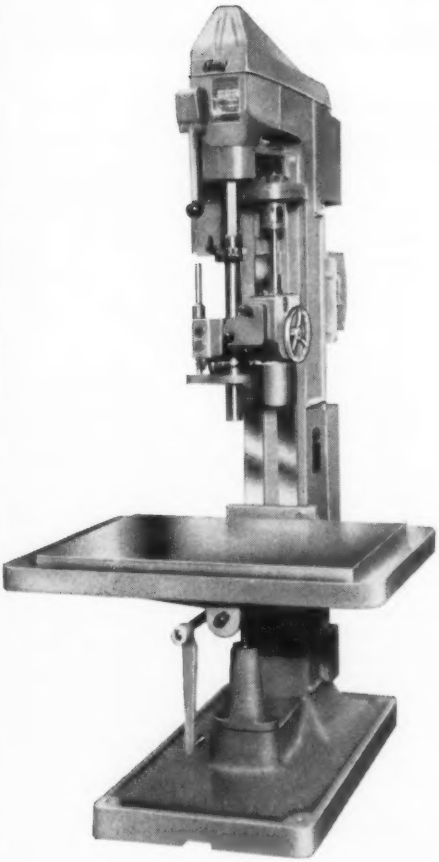
V

Valves, 159, 215
Vise Jaws and Stops, 223
Vises, Bench and Machine, 10, 11, 33, 59, 64, 174, 206, 224, 232, 235, 271, 273

W

Washing Machines, Industrial, 251
Welding Equipment and Supplies, 195
Wire Straighteners, 269
Wrenches, 107, 196
Wrenches, Impact, 57
Wrenches, Torque, 258

automatic cycle drilling machine



You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Motch & Merryweather Machinery Co., Box 1264, Cincinnati 1, Ohio.

another first by Avey

For more data circle 614 on Postpaid Card

index to advertisements

index to advertisements

For listing of products offered by these advertisers please consult the "Where To Get It" Section.

A.K. Tool Co., Inc. 253
Aber Engr. Wks., Inc. 249
Abrading Systems Co. 264
Abrasive Machine Tool Co. 12
Abrasive Products, Inc. 68d
Accurate Bushing Co. 37
Ace Drill 247
Acme School of Die Design, Inc. 237
Acme Tool Corp. 254
Aget Mfg. Co. 217
Airetool Mfg. Co. 240
Albertson & Co., Inc. 57
Alina Corp. 171
Allegheny Ludlum Steel Corp. 32
Allen Industries, Alva 229
Allison-Campbell Div.,
American Chain & Cable Co., Inc. 39
Allstate Diamond Products, Inc. 259
Aluminum Co. of America 35
American Chain & Cable Co., Inc.
Allison-Campbell Div. 39
Wilson Mechanical Instrument Div. ..38, 173
American Drill Bushing Co., Inc. 49
American Roller Die Corp. 74
American Saw & Mfg. Co. 75
Ames Co., B. C. 66
Anderson Bros. Mfg. Co. 165
Anton Machine Wks. 263
Apex Machine & Tool Co. 163
Armco Steel Corp. 53
Armstrong-Blum Mfg. Co. 24
Armstrong Bros. Tool Co. 107
Atlas Press Co., Clausing Div. 26
Auto Moulding & Mfg. Co. 245
Avey Div., Motch & Merryweather
Mchry. Co. 285

B & W Precision Products Co. 230
Bacon Felt Co. 204
Bald Eagle Corp. 249
Barber-Colman Co. 103, 146, 147
Barnes Co., Inc., W. O. 55
Barry Controls, Inc. 256
Bearings, Inc. 41
Bentley Industrial Corp. 225
Black Drill Co. 224
Blanchard Machine Co. 175
Blue M Electric Co. 233
Boston Gear Wks. 44
Boyar-Schultz Corp. 15
Bridgeport Machines, Inc. 25
Brightboy Industrial Div. 63
Buck Tool Co. 279
Buhr Machine Tool Co. 16, 17
Bunting Brass & Bronze Co. 199
Burr & Son, John T. 246
Busch Co., J. C. 207
Butterfield Div., Union Twist Drill Co. 95
Byco Industries 154

Card Div., Union Twist Drill Co. 142
Carroll Dividing Head Co. 254
Cerro de Pasco Sales Corp. 248, 251
Challenge Mchry. Co. 234
Chicago Mfg. & Dist. Co. 211
Chicago Quadrill Co. 194
Chicago Tool & Engr. Co. 235
Cincinnati Gilbert Machine Tool Co. ..20, 274
Cincinnati Milling Machine Co. 10, 11
Cincinnati Milling Machine Co.,
Cincinnati Milling Products Div. 105
Cincinnati Sub-Zero Products Co. 43
Clark Instrument, Inc. 232
Clausing Div., Atlas Press Co. 26
Clemson Bros., Inc. 79
Cleveland Instrument Co. 62
Cleveland Punch & Shear Wks. Co. 203
Collis Co. 246
Columbia Cam Co. 261
Comet Tool Co. 239
Commander Mfg. Co. 202
Commercial Filters Corp. 205
Comtor Co. 266
Continental Machine Co. 213
Cook, Inc., L. H. 241

The Inside Story of a Finer Pump...

Electromagnetically balanced rotor cuts vibration, prolongs bearing life.

No seal

NOTE Fewer parts to wear and repair

No packing or priming needed



Heavy-duty pre-lubricated ball bearings require no further attention.

Model 11023-E

Built Better to wear longer — Write for our complete catalog. There's a type and model to suit you.

THE Ruthman MACHINERY CO.

- COOLANT PUMPS
- CIRCULATORS • AGITATORS
- MOLTEN METAL PUMPS

1817 READING ROAD • CINCINNATI 2, OHIO

For more data circle 615 on Postpaid Card

Cosa Corp. 88
Crucible Steel Co. of America 283
Cushman Chuck Co. 68a

DCMT Sales Corp. 231
Defiance Machine & Tool Co. 261
Desmond-Stephan Mfg. Co. 182
Detroit Power Screwdriver Co. 291
Detroit Stamping Co. 161
DeVlieg Microbore, Div. of DeVlieg Machine Co. 13
Dixon Automatic Tool Co., Inc. 164
Dreis & Krump Mfg. Co. 206
duMont Corp. 48
Dumore Co. 135
Durant Tool Supply Co. 269
Duro Metal Products Co. 213
Dykem Co. 223

Eastern Centerless Grinding Co. 170
Eastern Machine Screw Corp. 201
Eclipse Counterbore Co. 68
Economy Engr. Co. 228
Edroy Products Co. 226
Eisler Engr. Co., Inc. 227
Electro-Mechano Co. 255
Electro-Matic Products Co. 67
Ellis & Sons, Geo. 227
Enco Mfg. Co. 220
Engis Equipment Co. 19
Ex-Cell-O Corp. 84a,b,c,d

Famco Machine Co. 18
Field & Son, Inc., W. W. 223
Foote-Burt Co. 36
Foredom Electric Co. 269
Fosdick Machine Tool Co. 80, 81
Foster Supplies Co. 191
Fulmer Co., C. Allen 30

Gallmeyer & Livingston Co. 207
Gammons-Hoaglund 267
Gillen Co., John 210
Gisholt Machine Co. 9, 211
Gorton Machine Co., Geo. 40
Gotha, Inc. 253
Grant Mfg. & Machine Co. 245
Graphic Systems 100
Graymills Corp. 251
Greaves Machine Tool Co. 6
Greenerd Arbor Presses 239
Greenlee Bros. & Co. 76
Greenlee Tool Co. 170
Gwilliam Co. 237

Hamilton Tool Co. 153, 155
Hanson-Whitney Co. 277
Hardinge Brothers, Inc. 21
Harig Mfg. Co. 93
Heald Machine Co. 7
Heimann Mfg. Co. 227
Hi-Duty Drill Wks. 267
Himoff Machine Co., Inc. 219
Hoggson & Pettis Mfg. Co. 235
Holmes Gage & Development Corp. 174
Holo-Krome Screw Corp. ..... Fourth Cover
Howald Machine Wks., W. T. 239
Huron Machine Products, Inc. 89
Hy-Pro Tool Co. 28

Ideal Industries, Inc. 252
Index Industrial Corp. 61
Index Machine Co. 276

J & S Tool Co., Inc. 33, 273
Jacobs Mfg. Co. 60
Jiffy Mfg. Co. 241
Johnson Machine & Press Corp. 168
Johnson Mfg. Corp. 238

Kalins & Co., J. M. 272
Kapp Engineers, H. 170, 268
Kaufman Mfg. Co. 78
Keo Cutters 250
Kett Tool Co. 214
Kidde Precision Tool Corp. 236, 243

L-W Chuck Co. 64
Landis Machine Co. 4
Lassy Tool Co. 237, 250, 257
LeBlond Machine Tool Co., R. K. ..82, 83, 257
Leland-Gifford Co. 289
Lewthwaite Machine Co., T. H. 248
Lexco Engr. & Mfg. Corp. 255
Lilly & Co., Eli 71, 72, 73
Lincoln Electric Co. 195
Linley Bros. Co. 219
Lodding, Inc. 193
Lodge & Shipley Co. 29
Logan Engr. Co. 5
Logansport Machine Co., Inc. 159
Lubriplate Div., Fiske Bros. Refining Co. ..190

M.B.I. Export & Import, Ltd. 271
Madison-Kipp Corp. 237
Marshall Steel Co. 215
Mattison Machine Wks. 169
Metallizing Engr. Co., Inc. 189
Miller Fluid Power Div., Flick-Reedy Corp. 192
Mohr Tool & Mfg. Co. 259
Moore Special Tool Co., Inc. 275
Morris Co., Robt. E. 58
Mummert-Dixon Co. 231

National Acme Co. 22, 23, 87
Neise, Karl A. 259, 263

.....93
.....7
....227
....267
....219
....235
....174
Cover
....239
....89
....28

...252
....61
...276

3, 273
....60
...241
...168
...238

.272
, 268
...78
.250
.214
243

...64
....4
257
257
289
248
255
73
195
219
193
.29
.5
59
90

71
37
15
69
89

92
59
5
8
1

7
3

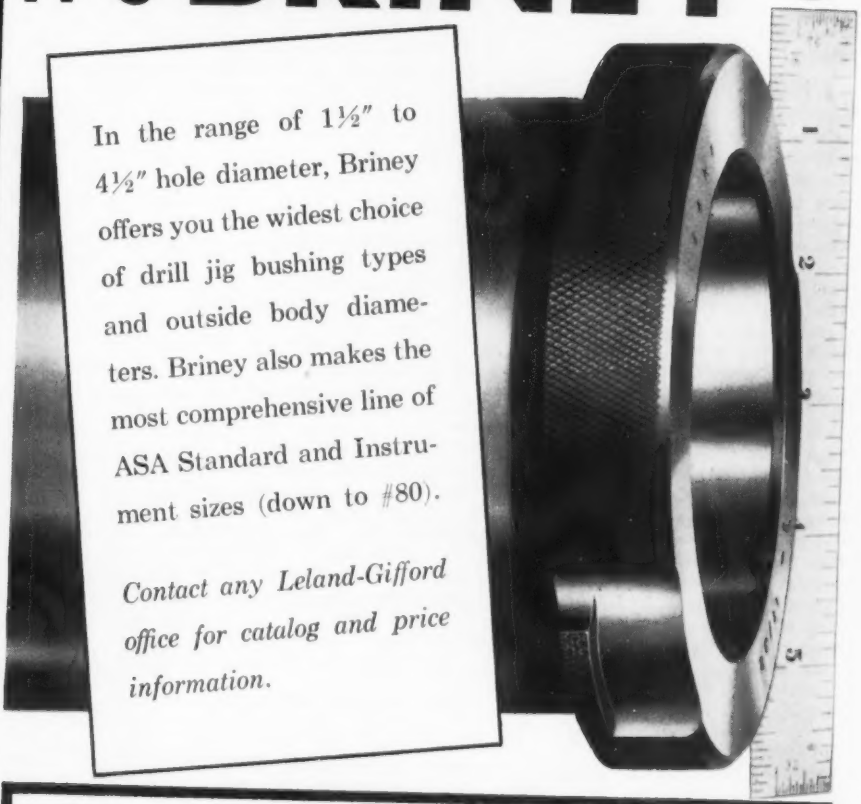
8

FOR BIG BUSHINGS IT'S BRINEY

TRADE MARK

In the range of 1½" to 4½" hole diameter, Briney offers you the widest choice of drill jig bushing types and outside body diameters. Briney also makes the most comprehensive line of ASA Standard and Instrument sizes (down to #80).

Contact any Leland-Gifford office for catalog and price information.



Sold and Distributed by

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

Chicago 45
2515 W. Peterson Ave.

Detroit
10429 W. McNichols Rd.

Cleveland 22
P.O. Box 853

New York Office
75 S. Orange Ave.
South Orange, N. J.

Los Angeles Office
2620 Leonis Blvd.
Vernon 58, Cal.

Indianapolis 6, P. O. Box 1051

Rochester 12, P. O. Box 24, Charlotte Station

For more data circle 616 on Postpaid Card

Niagara Machine & Tool Wks. 132, 133
Nichols-Morris Corp. 174
Nielsen, Inc. 258
Nielsen Tool & Die Co. 219
Nirol Mfg. Co. 233
Norton Co. 50, 51, 77
Numberall Stamp & Tool Co. 236
Nu-Tangs, Inc. 162

OK Tool Co., Inc. 149
Oliver Instrument Co. 46, 47
Oneida Machine Tool Corp. 249
O'Neil-Irwin Mfg. Co. 68b, 68c
Opto-Metric Tools, Inc. 229

Pace Engr. Co. 235
Parker-Majestic, Inc. 52
Perfection Gear Co. 222
Perkins Machine & Gear Co. 187
Petz-Emery, Inc. 262
Pines Engr. Co., Inc. 196
Polyplan Co. 274
Pope Mchry. Corp. 14
Porter Machine Co. 231
Pratt & Whitney Co., Inc. 96, 97, 98, 99
Prebco Bushing Co. 233
Precise Products Corp. 167
Precision Tool & Mfg. Co. of Ill. 211
Procunier Safety Chuck Co. 185
Pyrometer Instrument Co. 164

Raymond Mfg. Co. 184
Reed Rolled Thread Die Co. 200
Reich Mfg. Co., J. R. 154
Reid Tool Supply Co. 186
Retco Mfg. & Sales 243
Richards Co., J. A. 260
Ring Punch & Die, Inc. 56
Robbins Co., Omer E. 54
Rockford Engineered Products Co. 59
Rota File Corp. 235
Rowbottom Machine Co. 274
Royal Oak Tool & Machine Co. .....First Cover, 281
Ruthman Mchry. Co. 287

Sal Metal Products Co. 239
Savage Co., W. J. 255
Schauer Mfg. Corp. 172
Scherr Co., Inc., Geo. 257, 263
Schrillo Aero Tool Engr. Co. 45
Schmidt, Inc., Geo. T. 212
Scully-Jones & Co. 139
Sentry Co. 91
Service Machine Co. 198
Severance Tool Industries, Inc. 242
Sheldon Machine Co., Inc. 183
Shell Oil Co., Inc. 84
Sidney Machine Tool Co. 16, 17
Simonds Saw & Steel Co. 101
Somerset Tool Co. 241
Sopko & Sons Co., Wm. 253
Sossner Tap & Tool Corp. 86
Spartan Saw Wks., Inc. 270
Spellman Co., R. L. 265
Sperman Metal Specialties 268
Standard Electrical Tool Co. 292
Standard Steel Specialty Co. 260
Stevens, Inc., John B. 261
Sturdy Broaching Service, Inc 231
Sturtevant Co., P. A. 258
Sundstrand Machine Tool Co. 219
Sundstrand Machine Tool Co., Sundstrand Magnetic-Pneumatic Products ..134
Sunnen Products Co. 27
Superior Hone Corp. 42
Supreme Products Corp. 141
Sutton Tool Co. .....Third Cover

Taft-Peirce Mfg. Co. 244
Texas Co. .....Second Cover
Thermo Electric Mfg. Co. 208, 209
Thomas Hoist Co. 247
Thriftmaster Products Corp. 241
Tools, Inc. 253
Torit Mfg. Co. 218
Torsion Balance Co. 243
Trico Fuse Mfg. Co. 245
Troyke Mfg. Co. 267

Union Twist Drill Co. 143
U. S. Drill Head Co. 216
Universal Metal Hose Co. 261
Up-to-Date Tool Co. 260

Victor Mchry. Exchange, Inc. 221
Victor Saw Wks., Inc. 85
Viking Shear Co. 233
Vimco Mfg. Co. 251
Vogel Tool & Die Corp. 140
Vulcan Tool Co. 8, 31

Wales-Strippit Co. 69
Walker Co., Inc., O. S. 188
Walls Sales Corp. 247
Wardwell Mfg. Co. 186
Watts Bros. Tool Wks. 243
Weldon Tool Co. 157
West Chemical Products Co. 65
Wicaco Machine Corp. 265
Wilson Mechanical Instrument Div. ..38, 173
Wirth & Son, Inc., Carl 227
Wisconsin Drill Head Co. 197

Yoder Co. 34

Ziegler Tool Co., W. M. 223

16, 17
..101
..241
..253
...86
..270
..265
..268
..292
..260
..261
..231
..258
..219

..134
...27
...42
..141
Cover

..244
Cover
. 209
..247
..241
..253
..218
..243
..245
..267

..143
..216
..261
..260

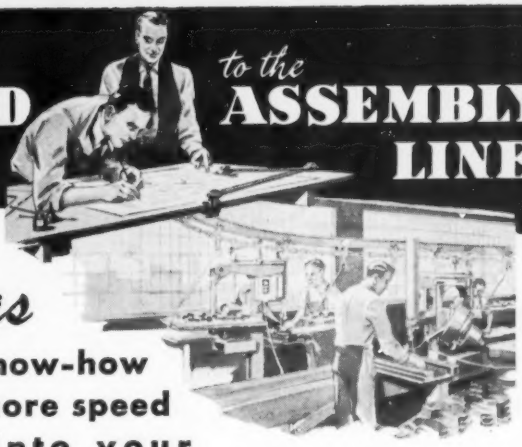
..221
...85
..233
..251
..140
, 31

...69
..188
..247
..186
..243
..157
...65
..265
..173
..227
..197

...34
..223

958

from the **BOARD** *to the* **ASSEMBLY LINE**



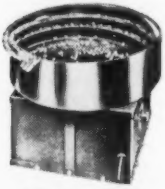
DPS *has*

the technical know-how to "*engineer*" more speed and profit into your assembling operations.

● The signal success of DPS trained engineers in adapting power equipment to the individual feeding and assembling needs of industrial plants everywhere is assurance that they can likewise solve your special problems. In our broad line of

SELECTIVE PARTS FEEDERS
POWER SCREWDRIVERS
SPECIAL ASSEMBLING MACHINES

equipment can be selected, and custom features incorporated, to fit your requirements. Plan now to use DPS modern assembling methods. Tell us your set-up. Write for catalog and further details.



BOWL FEEDER
Electrical vibratory type to feed parts that cannot be tumbled.



POWER SCREWDRIVERS
An extensive, versatile line in both bench and pedestal types.

BARREL FEEDER
Popular motorized type, for parts requiring critical selection.

DETROIT POWER SCREWDRIVER CO.

2807 W. FORT STREET • DETROIT 16, MICHIGAN

For more data circle 617 on Postpaid Card

AT STANDARD
WE'RE IN IT

UP TO OUR EARS!



FASTER — CUTS MACHINING TIME

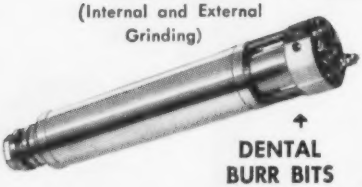
PRODUCES A FINER FINISH

ELIMINATES HEAT-DISTORTION

REDUCES WHEEL COST UP TO 90%

IN THIS NEW FIELD,
STANDARD
SUPER PRECISION
SPINDLES
ARE FINISHING DOZENS
OF HARD METALS!

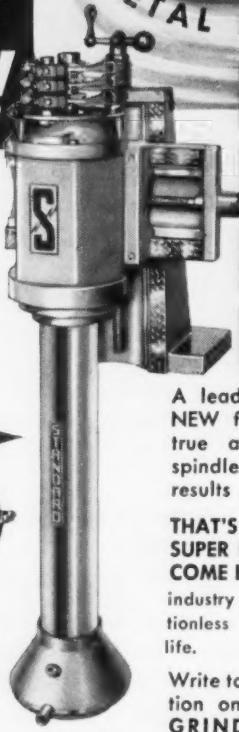
AIRCRAFT PARTS →
(Internal and External Grinding)



DENTAL BURR BITS



HYPODERMIC NEEDLES



Write for Catalog today.

A leading designer in this NEW field says: "A solid, true and smooth running spindle is essential for good results . . . "

THAT'S WHERE STANDARD SUPER PRECISION SPINDLES COME IN . . . Standard of the industry for accuracy, vibrationless operation and long life.

Write today for full information on **THE ELECTROLYTIC GRINDING PROBLEMS** WE'VE HELPED SOLVE . . . we'll work with you on yours. 75 to 3000 Amperes.

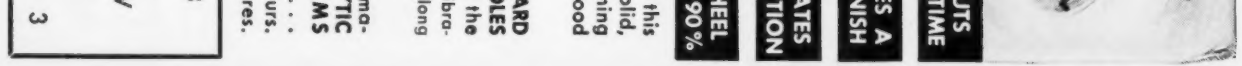
the STANDARD electrical tool co.

PRECISION SPINDLE DIVISION
2487 RIVER RD. • CINCINNATI 4, OHIO

BOOTH 128
WESTERN TOOL SHOW
Los Angeles
Sept. 29-Oct. 3

For more data circle 618 on Postpaid Card

→ Use this Postpaid Card for requesting more information on products described and advertised →



↓ Use this Postpaid Card for requesting more information on products described and advertised ↓

READER SERVICE CARD **OCTOBER, 1958**

Your Name_____ Your Title_____

Company Name_____

Company Address_____

City_____ Zone_____ State_____

Products Manufactured_____ Number of Plant Employees_____

modern machine shop

431 Main Street, Cincinnati 2, Ohio

DO NOT WRITE IN THESE SPACES

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue

EDITORIAL ITEMS

1	26	51	76	101	126	151	176	201	226	251	276
2	27	52	77	102	127	152	177	202	227	252	277
3	28	53	78	103	128	153	178	203	228	253	278
4	29	54	79	104	129	154	179	204	229	254	279
5	30	55	80	105	130	155	180	205	230	255	280
6	31	56	81	106	131	156	181	206	231	256	281
7	32	57	82	107	132	157	182	207	232	257	282
8	33	58	83	108	133	158	183	208	233	258	283
9	34	59	84	109	134	159	184	209	234	259	284
10	35	60	85	110	135	160	185	210	235	260	285
11	36	61	86	111	136	161	186	211	236	261	286
12	37	62	87	112	137	162	187	212	237	262	287
13	38	63	88	113	138	163	188	213	238	263	288
14	39	64	89	114	139	164	189	214	239	264	289
15	40	65	90	115	140	165	190	215	240	265	290
16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
20	45	70	95	120	145	170	195	220	245	270	295
21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
23	48	73	98	123	148	173	198	223	248	273	298
24	49	74	99	124	149	174	199	224	249	274	299
25	50	75	100	125	150	175	200	225	250	275	300

ADVERTISEMENTS

301—Front Cover					410	435	460	485	510	535	560	585	610
302—Inside Front Cover					411	436	461	486	511	536	561	586	611
303—Inside Back Cover					412	437	462	487	512	537	562	587	612
304—Back Cover					413	438	463	488	513	538	563	588	613
305	326	347	368	389	414	439	464	489	514	539	564	589	614
306	327	348	369	390	415	440	465	490	515	540	565	590	615
307	328	349	370	391	416	441	466	491	516	541	566	591	616
308	329	350	371	392	417	442	467	492	517	542	567	592	617
309	330	351	372	393	418	443	468	493	518	543	568	593	618
310	331	352	373	394	419	444	469	494	519	544	569	594	619
311	332	353	374	395	420	445	470	495	520	545	570	595	620
312	333	354	375	396	421	446	471	496	521	546	571	596	621
313	334	355	376	397	422	447	472	497	522	547	572	597	622
314	335	356	377	398	423	448	473	498	523	548	573	598	623
315	336	357	378	399	424	449	474	499	524	549	574	599	624
316	337	358	379	400	425	450	475	500	525	550	575	600	625
317	338	359	380	401	426	451	476	501	526	551	576	601	626
318	339	360	381	402	427	452	477	502	527	552	577	602	627
319	340	361	382	403	428	453	478	503	528	553	578	603	628
320	341	362	383	404	429	454	479	504	529	554	579	604	629
321	342	363	384	405	430	455	480	505	530	555	580	605	630
322	343	364	385	406	431	456	481	506	531	556	581	606	631
323	344	365	386	407	432	457	482	507	532	557	582	607	632
324	345	366	387	408	433	458	483	508	533	558	583	608	633
325	346	367	388	409	434	459	484	509	534	559	584	609	634

1958

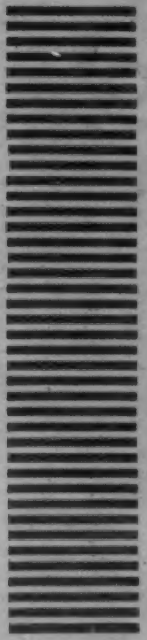
FIRST CLASS
PERMIT No. 1702
CINCINNATI, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

modern
machine shop

431 MAIN ST.
CINCINNATI 2, OHIO





why our company specifies –



1

Suttons run true and hold true; modern and exclusive method of heat-treating assures uniform temper and tension!

2

Suttons have the famous "Diamond Grip" serrations; grip tighter, reduce spoilage and clean themselves!

3

Suttons are precision ground inside and out; they are properly hardened, drawn, and stress relieved; and, their accurate threads give true alignment!

4

Sutton designs special work-holding devices to our needs; Sutton has facilities to hold tolerances, and produce at scheduled deliveries; Sutton gives us items at competitive prices.

The Source for **ALL** *Work-holding Devices!*

RUNS AS TRUE AS THE SPINDLE

Immediate Delivery!

Sutton Tool Co.

Sturgis, Michigan

For more data circle 303 on Postpaid Card

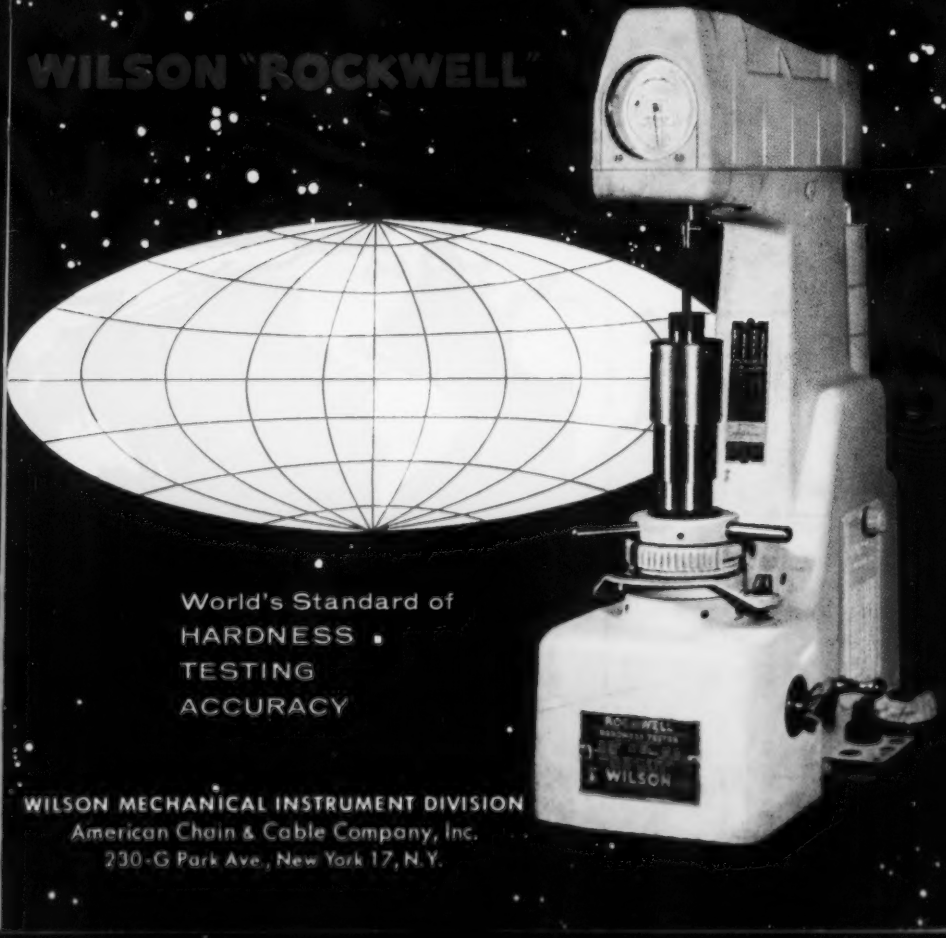
modern machine shop

HOW TO HEAT TREAT PROFITABLY
See Page 108

PRECISION MACHINING OF COMPLEX PARTS
See Page 116

NOVEMBER 1958

WILSON "ROCKWELL"



World's Standard of
HARDNESS
TESTING
ACCURACY

WILSON MECHANICAL INSTRUMENT DIVISION
American Chain & Cable Company, Inc.
230-G Park Ave., New York 17, N.Y.